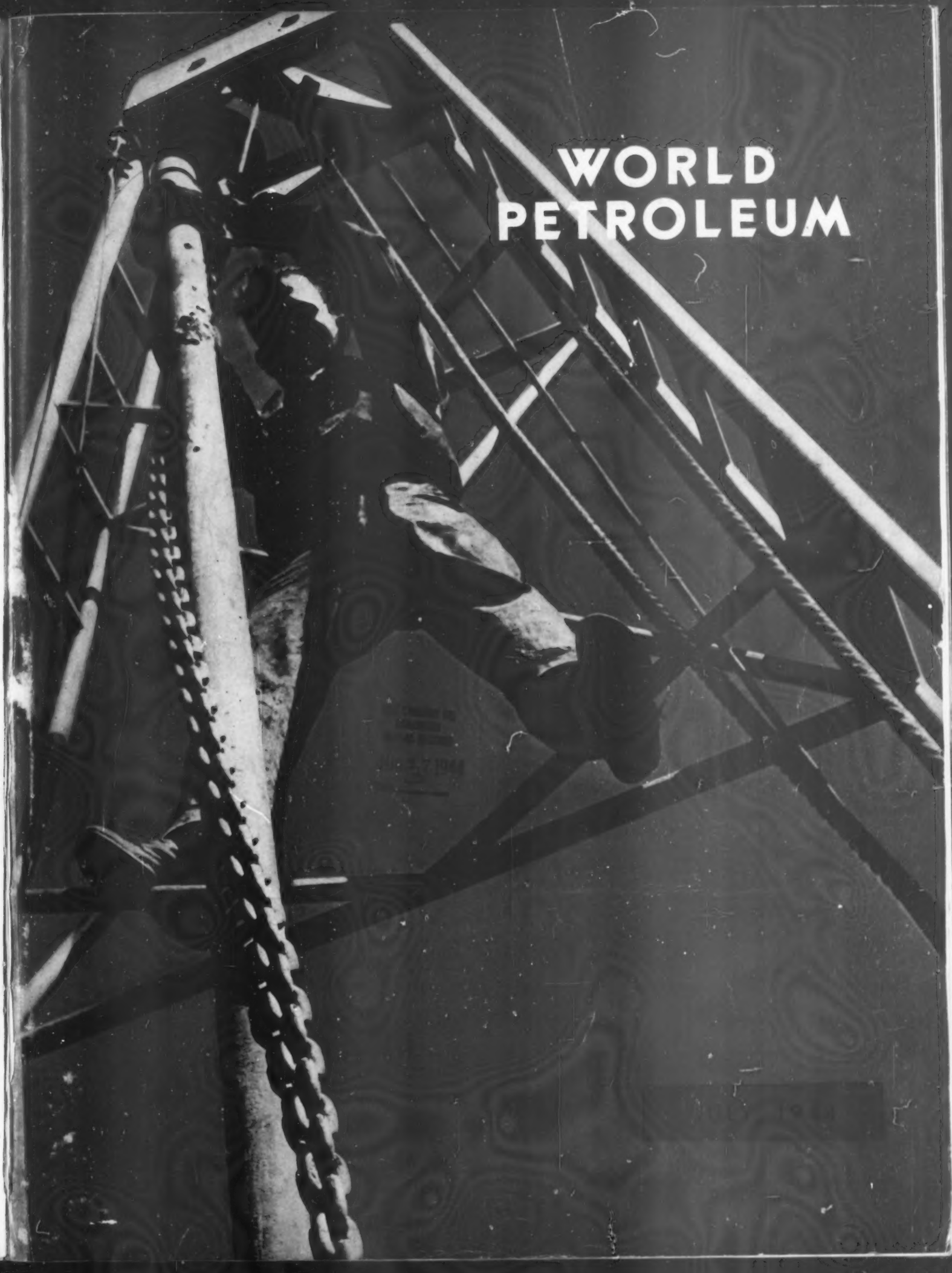
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Elbows	90° Short Radius	1"-30"	1½"-30"				
Elbows	45° Long Radius	½"-30"	¾"-30"*	1"-12"	1"- 8"	4"-24"	3"-12"
Returns	180° Long Radius	½"-24"	1"-24"		3"- 8"	4"-24"	3"-12"
Returns	180° Short Radius	1"-30"	1½"-30"				
Returns	180° Extra Long Radius	1"-2½"	1"-2½"				
Tees	Straight	¾"-24"	¾"-24"	1"-12"	1"- 8"		
Tees	Reducing Outlet	¾"-24"	¾"-24"	¾"-12"	1½"- 8"		
Reducers	Concentric & Eccentric	1x½-24x20	1x½-24x20		1"- 8"		
Caps		1"-24"	1"-24"				
Stub Ends	Lap Joint	1"-24"	1"-24"				
Nipples	Shaped, 90° to Header	1¼"-12"	1¼"-12"				
Nipples	Shaped, 45° to Header	1¼"-12"	1¼"-12"				
Saddles			2"-24" **				
Laterals	Straight	1¼"-24"	1¼"-24"				
Laterals	Reducing-on-Run	1¼"-24"	1¼"-24"				
Crosses	Straight	¾"-24"	¾"-24"				
Rings	Welding	¾"-12"	¾"-12"				
Sleeves	Welding		2"-24" **				

	150 Lb.	300 Lb.	400 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.
Welding Neck	½"-24"	½"-24"	½"-24"†	½"-24"	½"-24"*	½"-24"	½"-24"
Slip-On	½"-24"	½"-24"	½"-24"†	½"-24"	½"-24"*	½"-24"	½"-24"
Lap Joint	½"-24"	½"-24"	½"-24"†	½"-24"	½"-24"*	½"-24"	½"-24"
Threaded	½"-24"	½"-24"	½"-24"†	½"-24"	½"-24"*	½"-24"	½"-24"
Blind	¼"-24"	½"-24"	½"-24"†	½"-24"	½"-24"*	½"-24"	½"-24"
Socket Type	¼"-24"	¼". 4"		¼"-3½"			
Reducing-threaded or slip-on	¾"-24"	¾"-24"	¾"-24"†	¾"-24"	¾"-24"*	¾"-24"	¾"-24"
Orifice—threaded		1"-24"	4"-12"	4"-12"	3"-12"	1"-12"	
Orifice—slip-on		1"-24"					
Orifice—welding neck		1"-24"	4"-12"	1"-12"	3"-12"	1"-12"	
Long Welding Neck	1"-24"	1"-24"	1"-10"	1"-10"	1"-10"	1"-10"	

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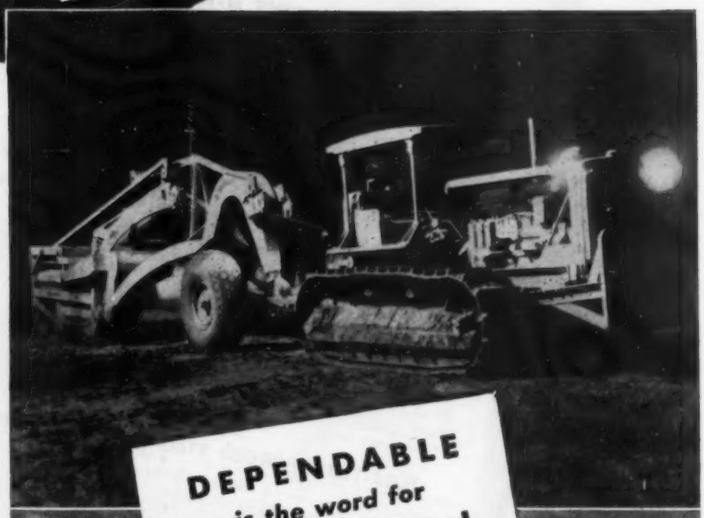

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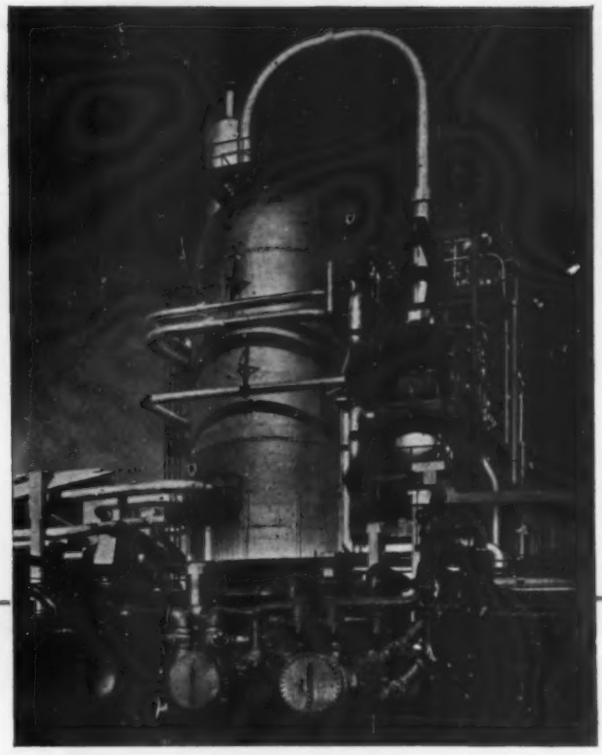

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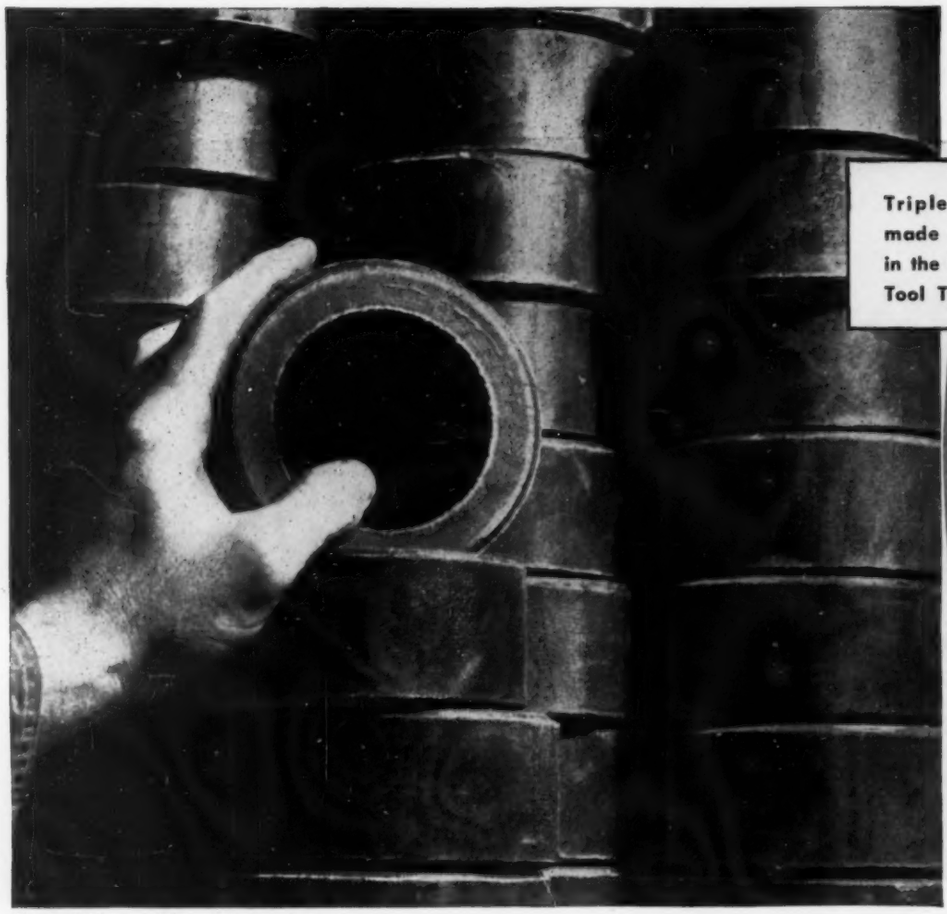

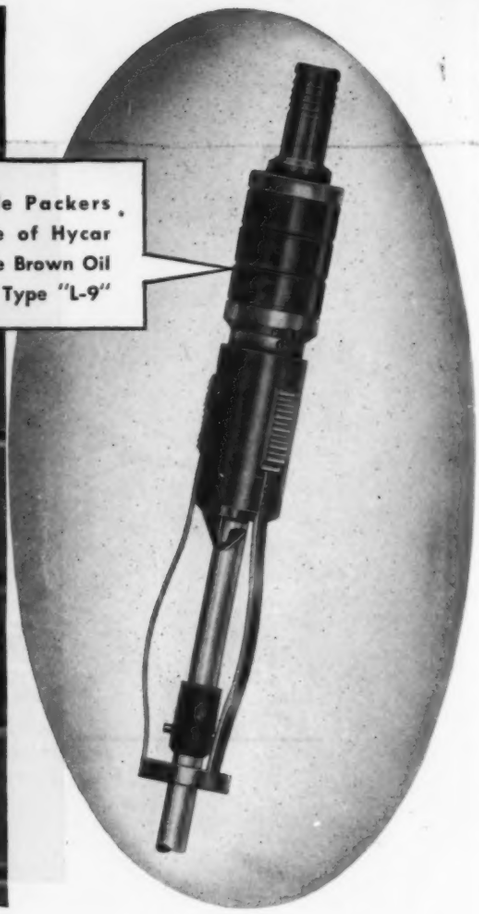

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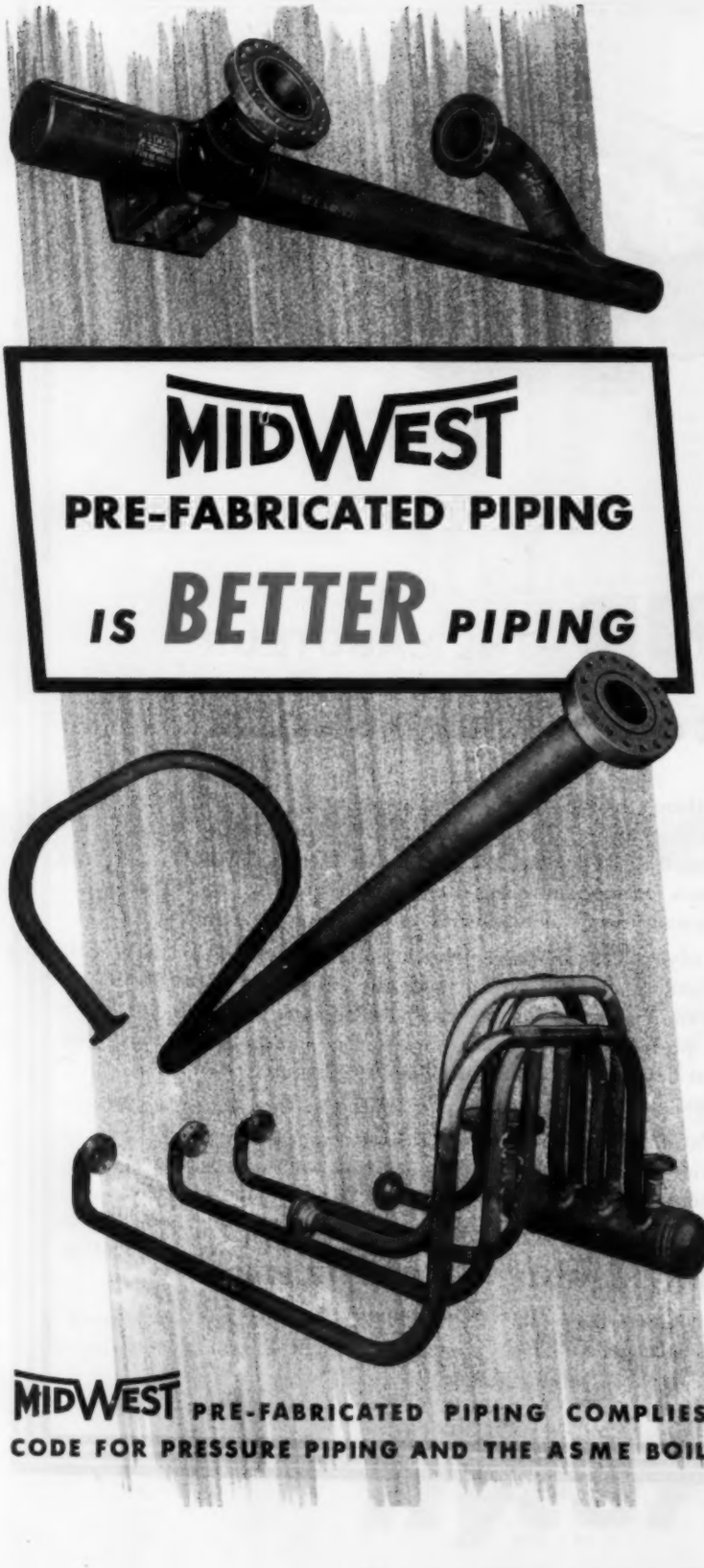

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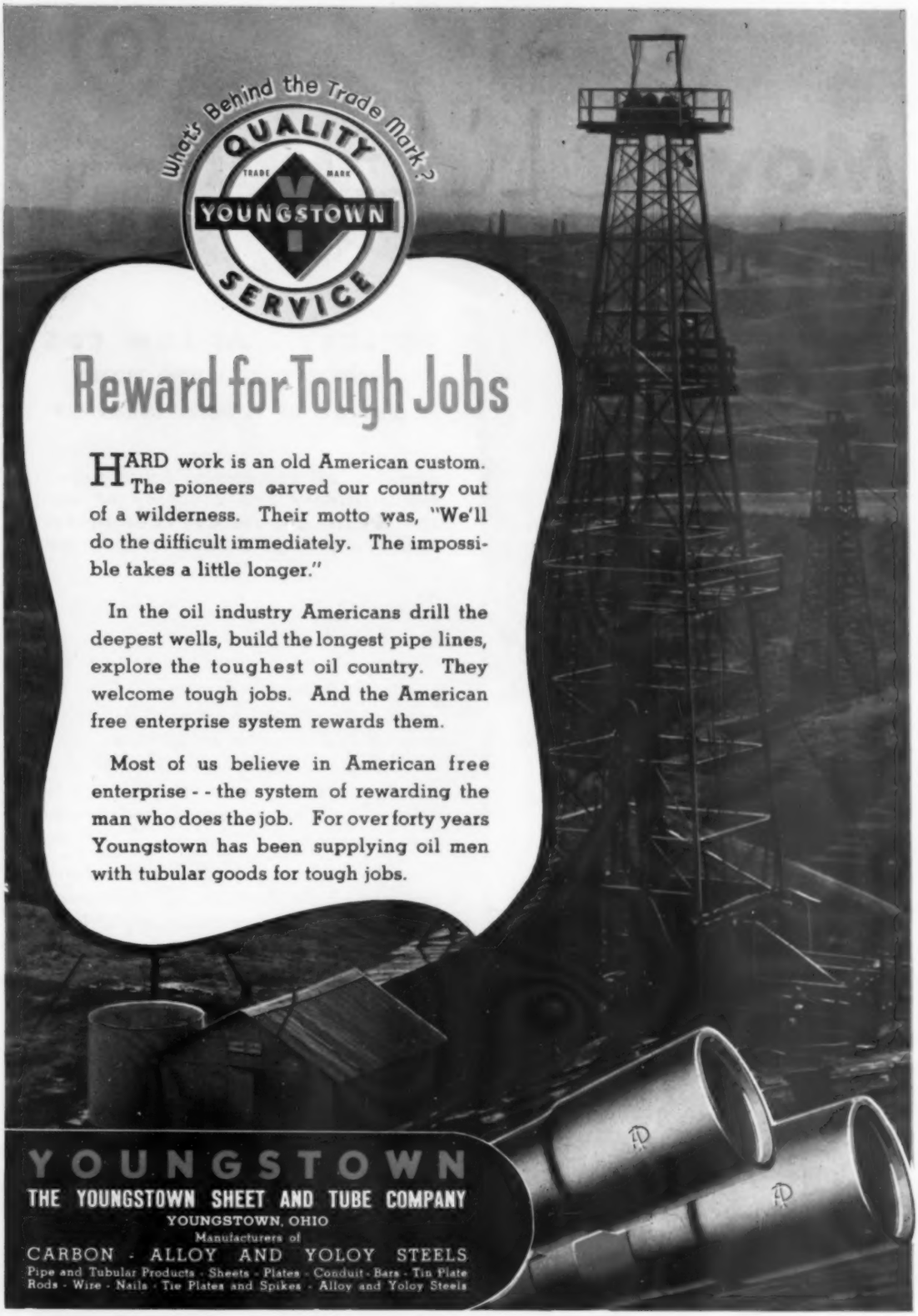
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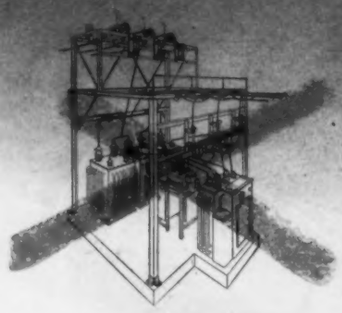

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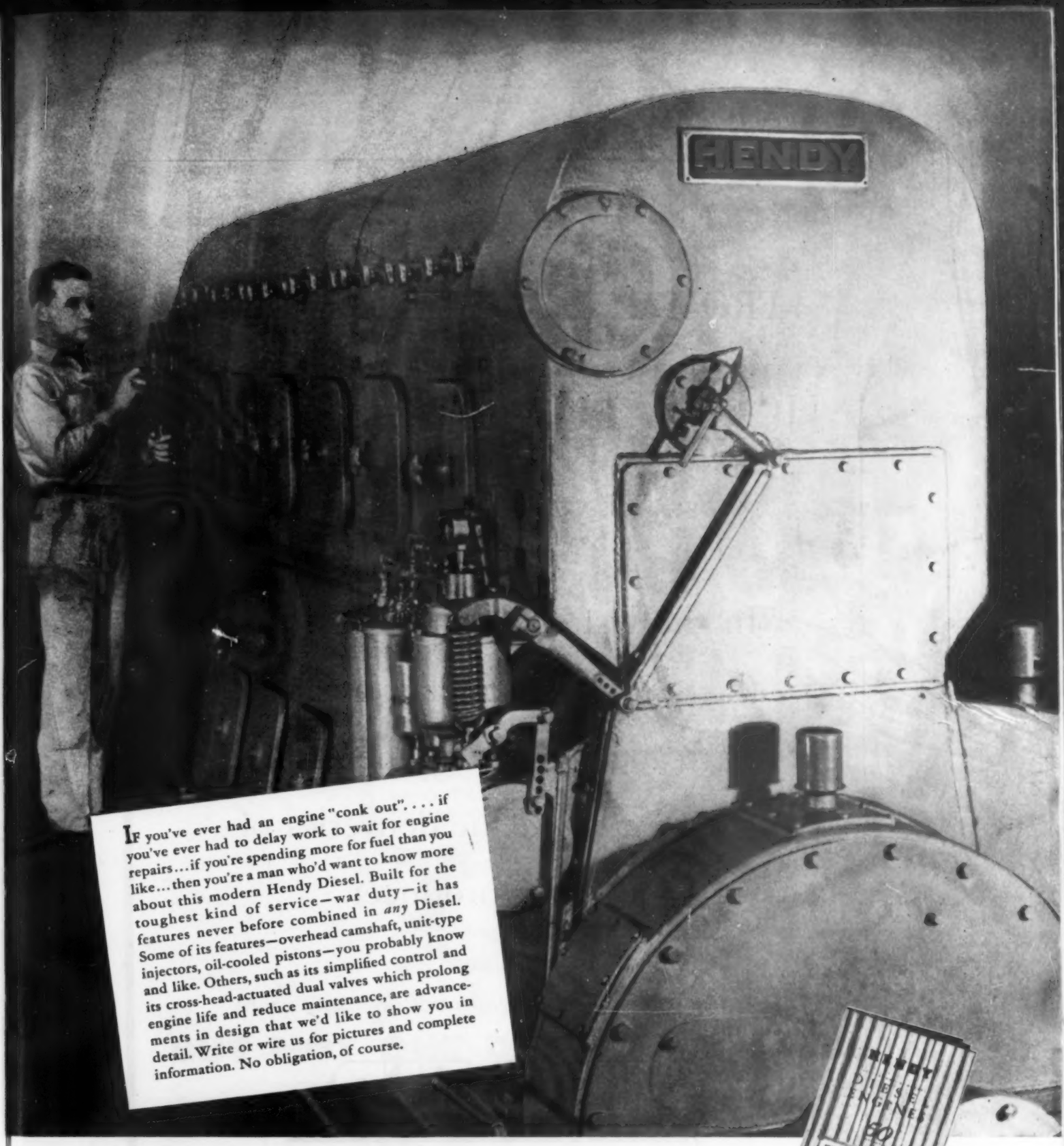

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"In the last six months of 1943 the volume of Sinclair aviation lubricants supplied to the Armed Forces *exceeded* the deliveries of any other producer."

SINCLAIR

NOTE: *This is the* second *in a series of advertisements sponsored by the petroleum industry in District No. 1 (Atlantic Coast), appearing in Sunday newspapers and signed by oil companies which supply virtually all of the gasoline sold in District No. 1. Oil companies in the other districts are planning to run similar advertising.*

More Gasoline than anyone else in the world . . .

BUT NOT ONE DROP TO WASTE!

The gasoline situation is serious. And we've all got to face it. From here on—every drop of gas wasted at home can SLOW DOWN the war.

THE REASON IS SIMPLE . . . The war machine America's been building since Pearl Harbor—the thousands of gas-eating planes and tanks and Jeeps and trucks and ships—is now ready and rolling on the attack. There's just not enough gas for their needs . . . and full use of the world's greatest passenger car fleet, too.

HERE ARE THE BARE FACTS . . . From 1942 to 1944, military need for gasoline stepped UP almost 4 times. From 1942 to 1944, total civilian passenger car gas supply has been CUT almost one-half.

YOUR PART IS THIS . . .

1. **Don't apply for more gas than you really need.**
2. **Get into a ride-sharing club and stick to it.**
3. **Endorse all your gas coupons now.**
4. **Don't take extra gas or coupons from anyone.**

YOU CAN HELP KILL THE BLACK MARKET!

The black market does not MAKE gasoline. It STEALS gas—currently some 2,500,000 gallons a day—from the essential home front supply left after military needs. It works chiefly with counterfeit coupons, peddled by the same gangs who deal in prostitution, bootleg liquor, dope, and other rackets. Many have been caught. More will be. But, without customers, the black gas racket would die overnight, making more gas available for regular rationing. *Don't take extra gas or coupons from anyone!*

GASOLINE POWERS THE ATTACK—DON'T WASTE A DROP!

AN Extra Hand ON THE TOUGH JOBS

TYPE H3R PACKER
Ideal production packer for wells up to 6,000 lbs. pressure. Easy to set and pull. Triple packing rings of special neoprene rubber. Not control head type, but has fluid bypass through mandrel.

CONTROL HEAD PACKER TYPE C-1
Efficient, all-purpose packer for high gas and oil pressures. For use for from 2,000 to 12,000 feet. Can be set higher or lower at will. No swabbing effect when pulled.

GUIBERSON TOOLS PUT AN "UNSEEN CREW" TO WORK FOR YOU AT NO EXTRA COST!

One third of an average well cost is crew time—that's why the use of correctly engineered, precision built Guiberson tools that save time put the equivalent of an extra hand on the job for you. And when it comes to the *tough* job there is a Guiberson tool built especially to get it done in the easiest, quickest way. The Type KV-30 Guiberson packer, especially designed for the most severe well testing and production conditions, is a proud member of the Guiberson "unseen crew." Easy to set, easy to pull, the KV-30 is designed for loads up to 20,00 feet of 2½" upset tubing and pressures up to 10,000 lbs. Gives positive recovery by sleeve between gudgeon coupling and head. Eliminates conventional recovery ring welded to mandrel. Double sealing with special neoprene sleeve and conventional ground seat. 30" opening eliminates nozzling effect at valve.

25 SAFE THAN SORRY BETTER BE GUIBERSON

Guiberson USA Established 1919

THE GUIBERSON CORPORATION
Dallas, Texas, U. S. A.

Export Representative: J. FRANK BROWN, 30 ROCKEFELLER PLAZA...NEW YORK, NEW YORK

LONG LASTING

FOR LOWER OPERATING COSTS AND EFFICIENT BRAKING, INSTALL FERODO FRICTION LININGS

When you think of monuments that epitomise lasting quality, you recall the tombs of the Pharaohs, the Sphinx and the Pyramids, standing steadfast through the long years. When you think of friction materials that possess long-lasting character of the highest order, your mind turns to Ferodo friction linings. Ferodo woven friction materials are manufactured to the highest standards of British quality to meet the particularly heavy duty imposed on drawworks brakes in drilling operations. Tough and absolutely dependable, they give powerful braking action over long periods without the need for renewal, and are smooth in action, providing marked economy in operating costs. Consult our agents, who will provide you with data, confirming the superior quality of Ferodo friction linings.

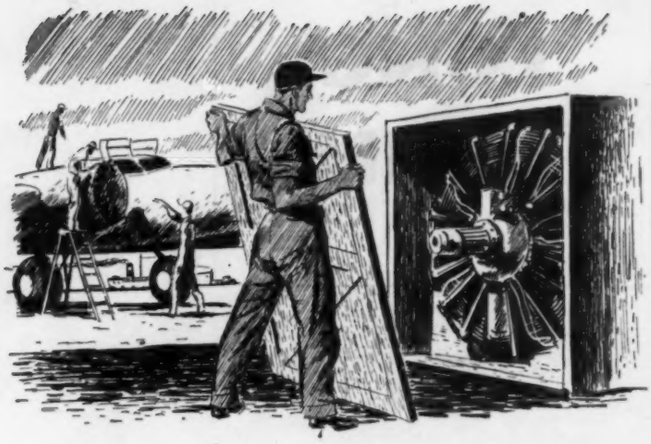
F E R O D O

FRICTION LININGS

Agents—**ARGENTINE, URUGUAY and PARAGUAY** : Anderson Levanti and Co., S.R.Ltda., Alsina 471/485, Buenos Aires. **CANADA** : J. C. McLaren Belting Co., 620, Beaumont Street, Montreal. **PERU** : Milne and Co., S.A.Lima. **U.S.A.** : Ferodo and Asbestos Incorporated, New Brunswick, New Jersey. **INDIA** : Asbestos Cement, Ltd., Mulund, Bombay. **TRINIDAD** : F. J. Miller and Co., 30, Richmond Street, Port of Spain. *FACTORY REPRESENTATIVE* in Chile, Peru, Bolivia, Equador and Columbia : A. Dodson, Casilla 2130, Santiago, Chile.

INSIST ON FERODO LININGS FOR BRAKE EFFICIENCY REGD. TRADE MARK FERODO

Credit Oil Another "Assist"!...



You take an airplane engine made of thousands of parts, many finished precisely to ten-thousandths of an inch . . .

You ship it by train and boat and plane—through fog and rain and snow and sleet and dust and heat . . .

You store it out there, thousands of miles away. And suddenly you need it.

So you uncrate it and install it—*completely rust-free and ready to fly.*

Oil helped make this near-miracle possible—*oil in the hands of men who know how.*

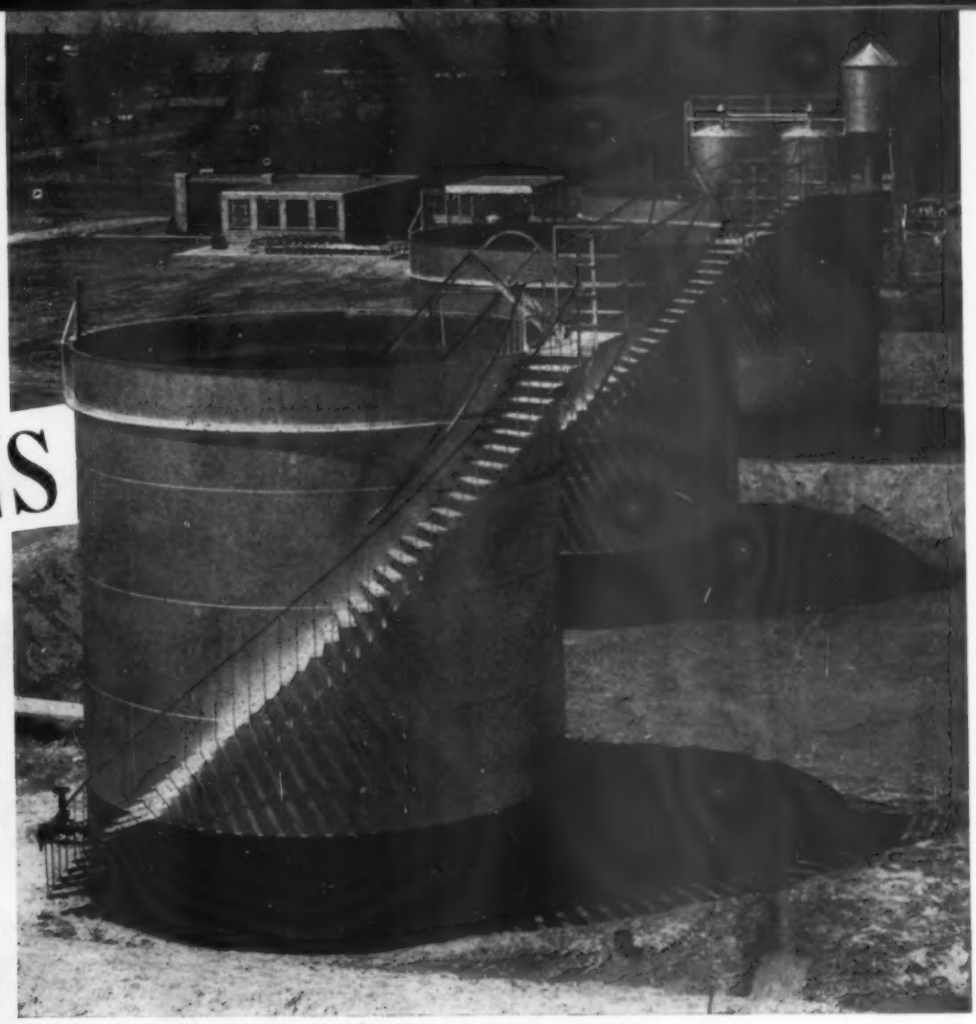
The marvelously effective rust preventive used for this purpose was originated by scientists in our laboratories—as so many other new things from oil have been—*and will be!*

STANDARD OIL COMPANY (NEW JERSEY)

AND AFFILIATED COMPANIES

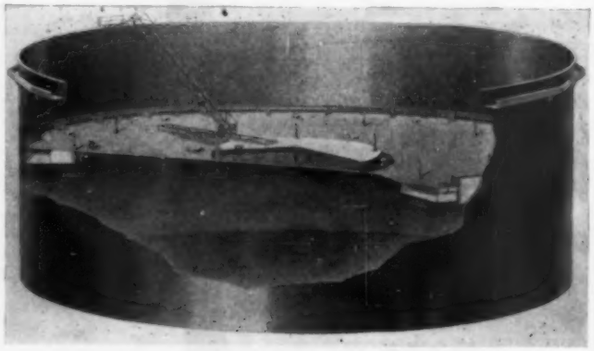
Our Eureka, California dry dock yard now flies the Army-Navy "E" flag with two white stars for continued outstanding performance in the production of war material.

WIGGINS Pontoon Roof Tanks



..... minimize evaporation losses in working tanks handling volatile liquids.

Shown below is a cut-a-way view of the new Wiggins high-deck Pontoon Roof. For tanks over 60 ft. in diam. the roof consists of an outer pontoon and a center pontoon deck, while tanks less than 60 ft. in diam. are constructed with an outer pontoon only.



• The vapor-saving characteristics of tanks equipped with Wiggins Pontoon Roofs have long been recognized in the oil industry. Today's acute need for more and more volatile liquids merely serves to emphasize the ability of these units to efficiently and economically stop evaporating losses from working tanks handling volatile liquids.

The new Wiggins high-deck Pontoon Roof floats directly on the liquid blanketing the surface at all levels. Thus it prevents all filling losses and practically all breathing losses as well as reducing fire hazard by eliminating the vapor space in a tank. Pontoon roofs may be installed on new or existing butt-welded, lap-welded or riveted tanks 15 ft. in diameter or larger.

Another type of "vessel" being built in our shops . . . LST ships for the U. S. Navy.

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Asphalt is just one of the raw materials used in the manufacture of MINTEX brake linings for industrial plant and machinery.

More important than this, or any other of the carefully selected raw materials, however, are the many years of research and of experience in manufacture and application which have built up the incomparable quality of *all* MINTEX brake and clutch linings.

"PHOENIX" Packings for all services and pressures, Steam, Hydraulic, Oil, Acid and Alkali resisting, etc.

"PHOENIXITE" Jointing, cross-laminated to resist pressure from all directions, for Steam, Superheated Steam, Acids, Alkalis, Gases, Water, etc.

PETROL and OIL resisting jointing a speciality.

"MINTEX" Friction Linings for Winding Gears, Tractors, Scoops, Cranes, Road Vehicles and Aircraft.

Machinery Belting for Driving, Conveying and Elevating.

Solid-woven, Endless Belts for all short-centre drives.

Asbestos Yarns, Cloths, Tapes and Lagging.

Where quality can ensure efficiency, safety and reliability you may expec. to find B.B.A. products.

BRITISH BELTING & ASBESTOS LTD.

CLECKHEATON — YORKSHIRE — ENGLAND

CALIFORNIA TEXAS OIL COMPANY LTD.

* * *

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. . . developed by extensive refinery and research organizations . . . backed by years of efficient practical performance

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EXPERT TECHNICAL SERVICE

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Newallastic

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Owing to the patented process by which they are manufactured, they have a greater resistance to fatigue than any bolts or studs hitherto obtainable.

The threads are produced by an entirely new method and are almost as accurate as the finest gauges.

"NEWALLASTIC" Bolts and Studs are the last word in STRENGTH AND ACCURACY.

A.P. NEWALL and CO., LTD.

POSSILPARK. GLASGOW. N.

Incredible output for America's war industries has been made possible by cutting, quenching, and lubricating oils developed through many prewar years of research.

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Flying Horsepower

AT THE SIGN OF FRIENDLY SERVICE

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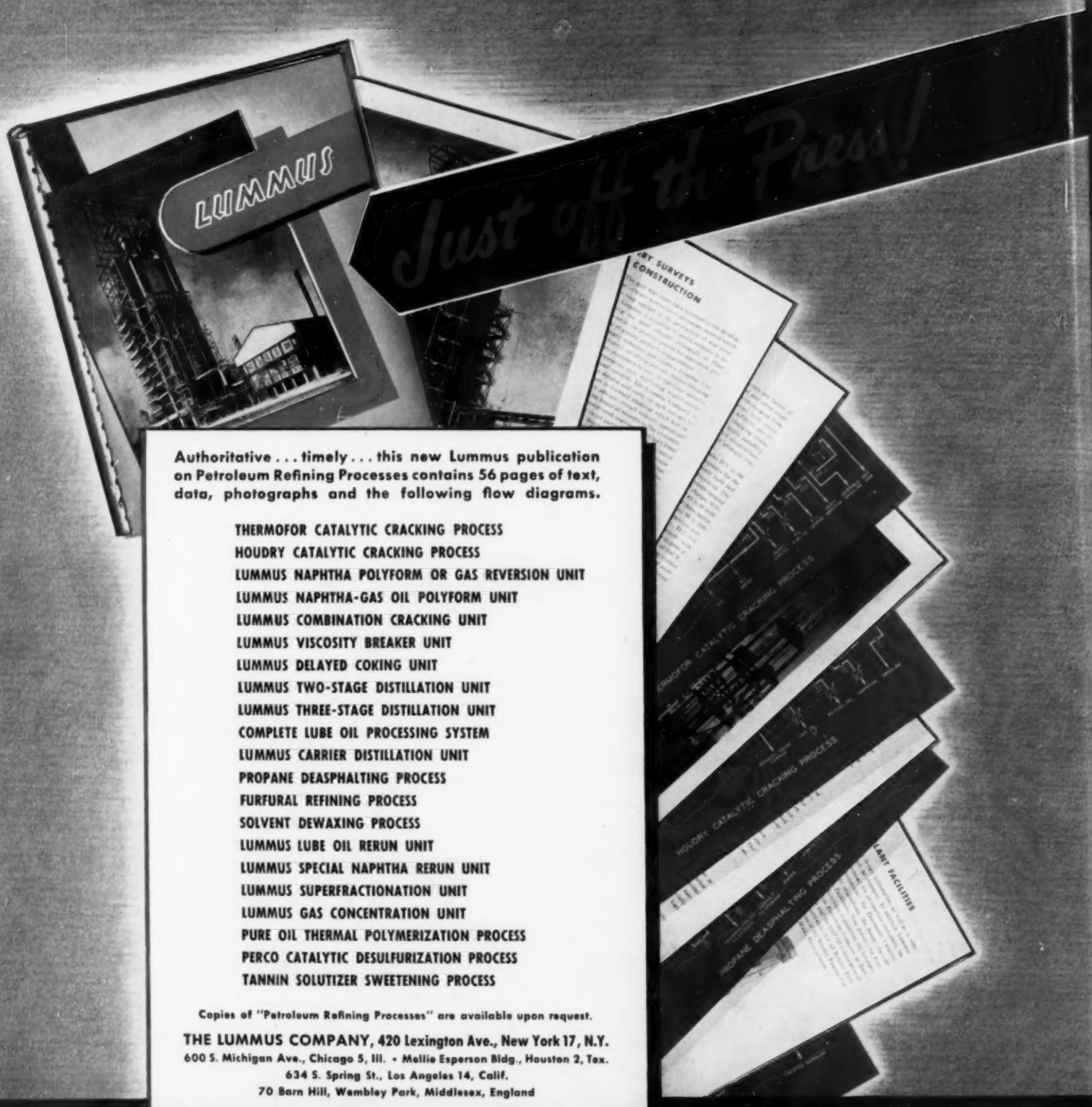
Mobilgas • Mobiloil Mobilubrication • Mobil Specialties

W.A.B.
See pp 2, 3, 34. How about TCC applications to our plants?
C.E.P.



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THE MANAGEMENT PUBLICATION OF THE INTERNATIONAL PETROLEUM INDUSTRY

VOLUME 15 | JULY, 1944 | NUMBER 7

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Rex W. Wadman
General Manager

E. W. Mayo
Editor

Victor N. Raiser
Advertising Manager

Sofie Cihowski
Assistant Editor

H. Arnold Jacobsen
Art Director

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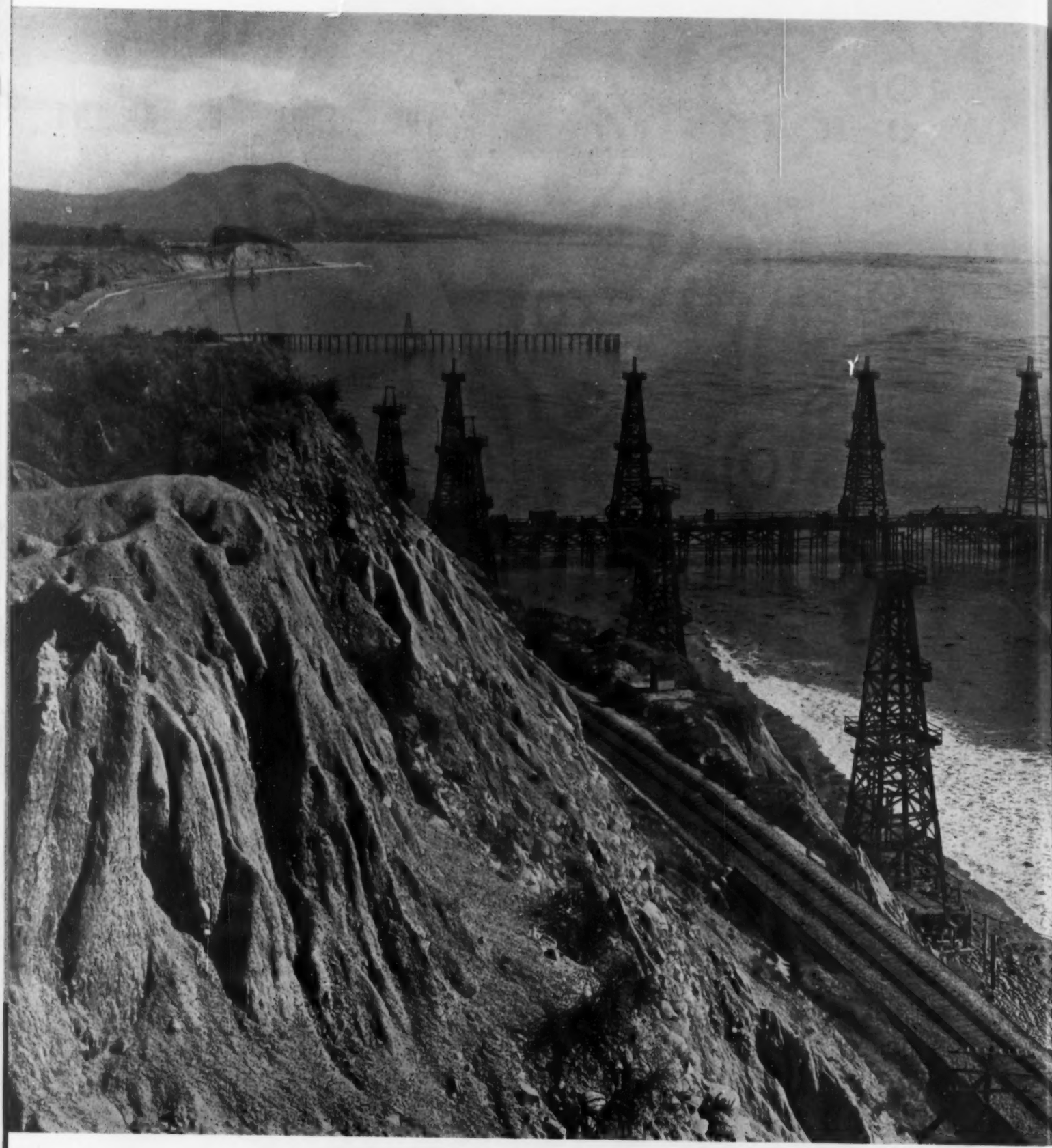


Oil Derricks on the Pacific Coast
Near Cumberland, Calif.

EDITORIAL

INDUSTRY MUST FACE POST WAR FALL IN DEMAND

DISTURBING statements as to the declining rate of oil discovery and an impending shortage of supply have created an impression in the public mind that a scarcity of petroleum products may be experienced at the end of the war and that civilian consumers may have difficulty in satisfying their normal requirements or at least may face the necessity of paying high prices for gasoline, fuel oil and other products in general demand. These statements, it may be observed, have not originated with members of the oil industry but have come in large part from Washington officials whose utterances because of their positions receive wide publicity. Sensational assertions that the age of oil discovery is ended in America and that existing reserves will be exhausted within twelve or fifteen years naturally receive more newspaper space and command larger headlines than do sober studies based on past experience and geologic knowledge.

Most of the misunderstanding on this subject stems from a failure to distinguish between the long term outlook and the immediate post-war position. It would be national folly to neglect the conservation of the natural resources upon which the economic progress of the nation depends, to permit the permanent loss of billions of barrels of oil through abandonment of low yielding wells or to fail in extending installations for pressure maintenance and secondary recovery to secure oil known to exist. These and other technical problems affecting future supply the oil industry is prepared to cope with unless it is prevented by arbitrary and unwise government interference with the economic structure of the industry. It is no less foolish to assume that a production which has been built up gradually to its present level of over 4,500,000 barrels daily and which is derived from fields extending from the Alleghanies to the Pacific will cease abruptly or decline if at all, except as a slow process extending over many more years than measure the past history of oil development.

A realistic view of conditions likely to prevail directly following the war indicates that the question of immediate concern to oil producers will be, not the finding of sufficient oil to meet current demands, but of finding markets to absorb the oil they will then be producing. The assumption that once the present severe restrictions upon the civilian use of gasoline and fuel oil are removed motor cars will again roll along the country's highways in pre-war numbers and that the accumulated demand for oil heating equipment will at once be satisfied is perhaps natural to those who have felt the deprivation of these conveniences but there are certain obstacles that cannot be immediately overcome.

Numerous studies by members of the automotive industry have led to estimates which more or less agree that the number of passenger motor cars in use in the United States will be reduced to between 22,000,000 and 23,000,000 by 1946, say 7,000,000 fewer than were in operation in 1941. A certain number of cars that have been laid up will come back into service when gasoline rationing ends but on the other hand many cars have been kept running far beyond the time when they normally would have been consigned to the junk heap and the rate of scrappage directly following the war may be expected to rise very sharply. According to the statements of motor car manufacturers they can hardly turn out more than 2,000,000 vehicles in the first year after the ending of hostilities permits the reconversion of their plants to peacetime output. Thereafter production may rise rather quickly to 5,000,000 or more yearly but the increasing number of cars forced out of commission by advancing age will keep net additions to not much more than 2,000,000 annually for the next several years. Assuming that the war in Europe will end in 1945 it probably will be 1950 at the earliest before the number of cars in use equals the total in operation in 1941. Predictions of radical changes in engine design and fuel consumption are scouted by automotive engineers who believe that the average annual consumption of gasoline per car will remain about the same as in pre-war years. Making a liberal allowance for the increased demand from private motorists a reduction of something over 15 percent in motor fuel demand appears inevitable once the heavy requirements of the armed forces end.

Investigation in fields supplied by other petroleum products indicates that the demand for kerosene, light distillate, for heating use, Diesel oil and lubricants will resume its expansion more quickly and continue it more rapidly than will be the case with gasoline because of different conditions in the industries consuming these products. Some differences of opinion exist as to the probable course of residual fuel oil

(*Continued on page 56*)

NEW DEPTH RECORD SET BY TEXAS WELL

By Frank B. Taylor

Phillips Company's Pecos County Wildcat Price No. 1 Becomes World's Deepest Well by Penetrating to 15,279 Feet—Regulation Equipment Withstood Severest Tests

THE world's deepest well is being tested for production. As the deepest hole ever drilled by man into the crust of the earth, Phillips Petroleum Company's Ada Price 1 represents a remarkable achievement. But even more significant than the depth alone, is the fact that this well was drilled with regular, or standard, heavy duty rotary equipment that was neither especially designed nor fabricated for record depths. When the test was spudded there was no intention to drill past normal markers; much less to establish a new world record.

From surface to total depth of 15,279 feet the well is an automatic endorsement of engineering skill, equipment design and manufacture. It definitely points the path toward still greater depths in drilling—deeper exploration of the earth's sediments.

Prior to staking the location for what was then assumed would be a routine test, the region was surveyed with gravity meter and somewhat later the area of the vicinity had twice been gone over with seismograph. Surface geology supported the seismic survey which was made difficult by a blanket of Edwards limestone through which reflections were not always reliable in analysis. Later, the problems involved in shooting through this formation have been overcome and it is now possible to accurately interpret such a survey. The area in the vicinity of the location was also studied by means of core holes to shallow depths.

Location was staked 1980 feet from the North and West lines of Section 11, Block 101, T. C. Ry. Survey, southeast of the center of Pecos County, West Texas. (See Map). The spot was in rank wildcat territory somewhat south of major West Texas development. Nearest production to the location was at Fort Stockton 30 miles to the northwest and Yates, approximately the same distance to the northeast. The geologic age in which the hole is bottomed is Ordovician which is productive in the Ellenburger section in which nearby fields as Heiner, Apco-Warner, Wentz and Abel across the county line to the north of the Phillips well. The farm name on the location was Price, with the elevation being 3,257 feet. Ownership was 100 percent Phillips Petroleum Company.

The well was spudded June 30, 1942. Comanchean limestone (Permian), which reflects many of the deep-lying structural conditions of the area, served as an ideal foundation for the 136-foot derrick.

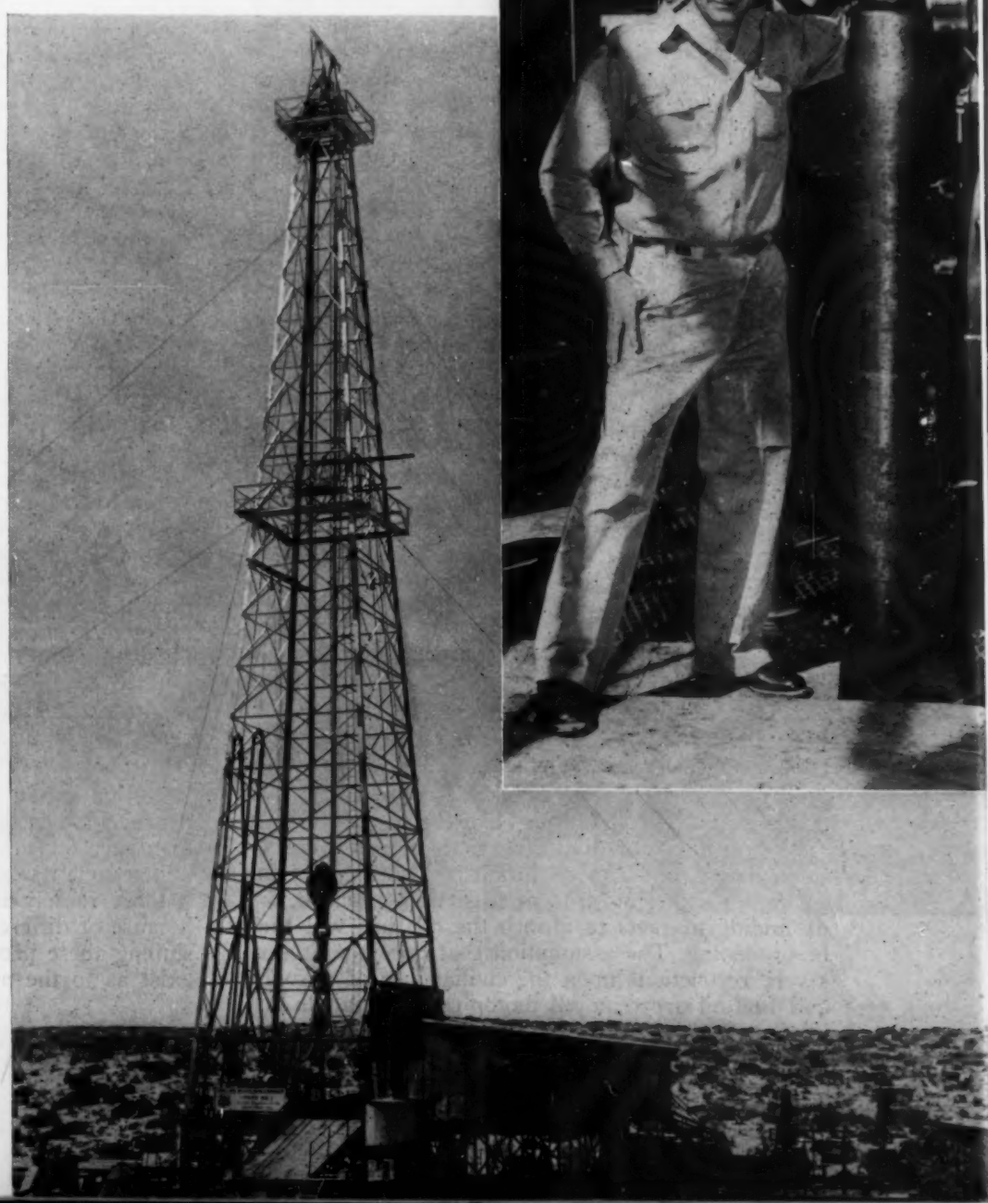
Photos by Fred L. Rice.

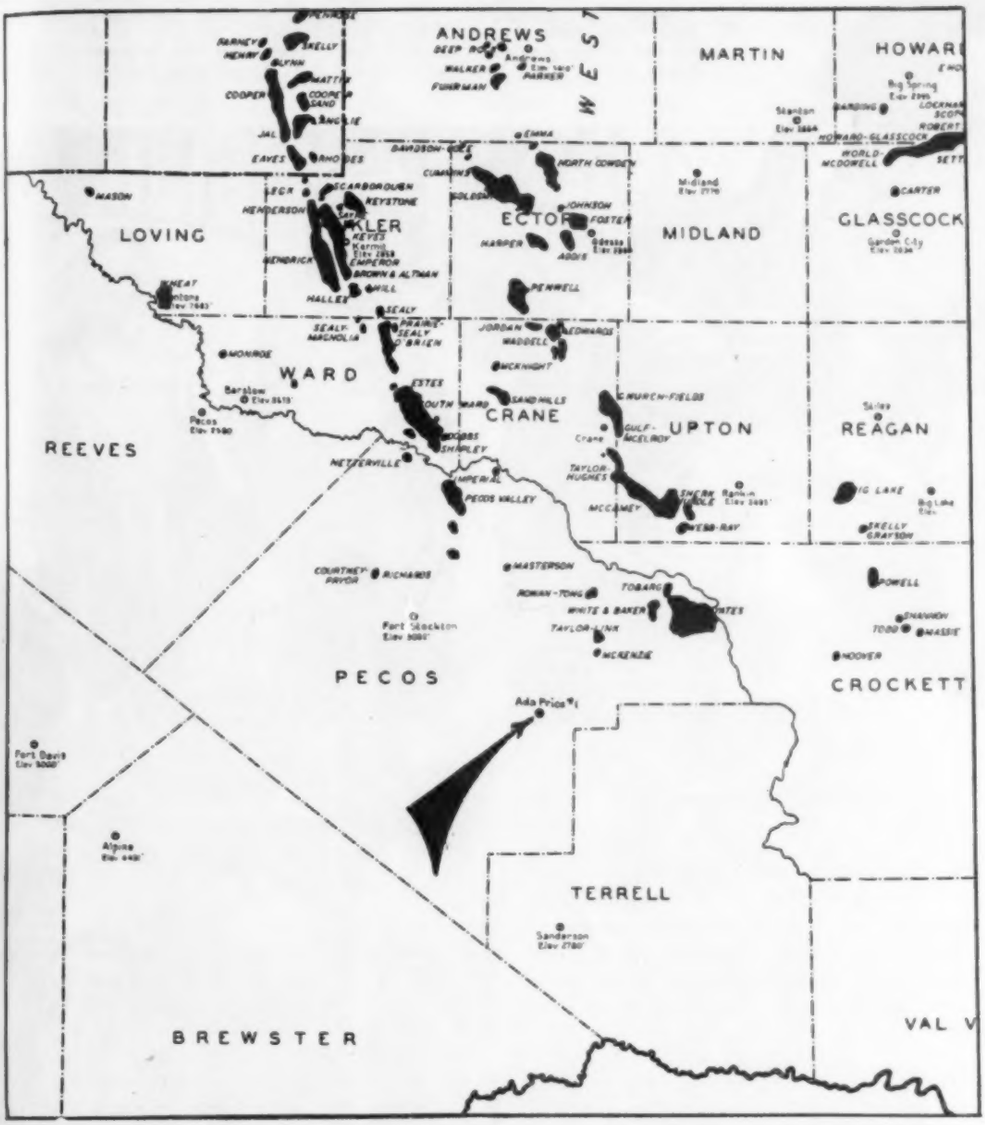
The test was spudded with cable tools and hole was drilled 10 feet past the bottom of the limestone to 520 feet. Twenty-inch casing was then run to 507 feet and cemented with 1270 sacks of cement, 300 of which were used outside the casing.

On July 28 drilling with cable tools was discontinued and this equipment was moved out and the rotary derrick immediately constructed and rigged. The derrick was conventional with dual guys at the fourble-board and water-table levels, but lacking any unusual reinforcing at any point. Despite the demands later made upon it the derrick required neither plumbing nor adjustment during its service although in January of this year its condition was thoroughly checked in a program of general inspection that included all equipment at the site. At the same time that cellar was being dug for the rotary, the water well was completed to 532 feet and put on the pump. Actual construction of the derrick was delayed through inability to obtain rig builders, part of a manpower problem that plagued the operators throughout the drilling of the well. In all, adding usual labor turnover to military

Right: A. G. Baker—Driller on Price No. 1.

Below: World's Deepest Well. Hole is Bottomed at 15,279 Feet in Simpson (Ordovician).





Map Showing Location of Price No. 1 in Relation to Development Fields in West Texas.

and the first definite shows were encountered at 3990-4000 where a slight gas odor was noted in a break in a lime section drilled from 2800 to 4603 feet. This show of gas was slight.

The general lime section, widespread in this area, gave way to thick beds of shade at 5365 feet, and except for sand breaks which increased numerically as the hole deepened, drilling was easy. A short core recovered at 8326 showed shale and sand with no oil or gas apparent, and with formations becoming more dense. It was near the 8650-foot level that definite markers had been anticipated that would allow checking the formations with those encountered in adjacent fields in which wells had been drilled to similar depths. For this reason the well was shut down in January of 1943 and a core pulled from 8665-69 feet. Ordovician formations were the chief goal of the test. In Sand Hills sediments of this age are at 6,000 feet, in Embar they are between 7,500-8,000 feet and at Apco they are considerably more shallow at 4,500 feet.

While Price I is located only a relatively short distance south of the general trend of West Texas development, subsurface control at the drilling depths was lacking and there was nothing to indicate the abrupt dip of Ordovician sediments. This fact, plus the fact that no encouraging shows had been encountered up the hole, prompted the operators to continue the effort.

On March 27, 1943, the test passed the 10,000 foot marker and was shut down to run an electric log. Hole was then reconditioned to 11 inches down to 6901 feet and a string of 8⅝-

Production Department Officials at the Site While a New Record Was Being Established. From Left to Right: Glen Whitman, Superintendent; M. L. Atkinson, Assistant Division Superintendent; C. P. Dimit, Vice President in Charge of Production; Charles Daniels, Division Superintendent, Western Division; W. C. Russell, Superintendent, Big Springs District; D. Ballew, Superintendent, Drilling Division; Shirley Miller, District Drilling Superintendent and J. S. Montgomery, Regional Superintendent.

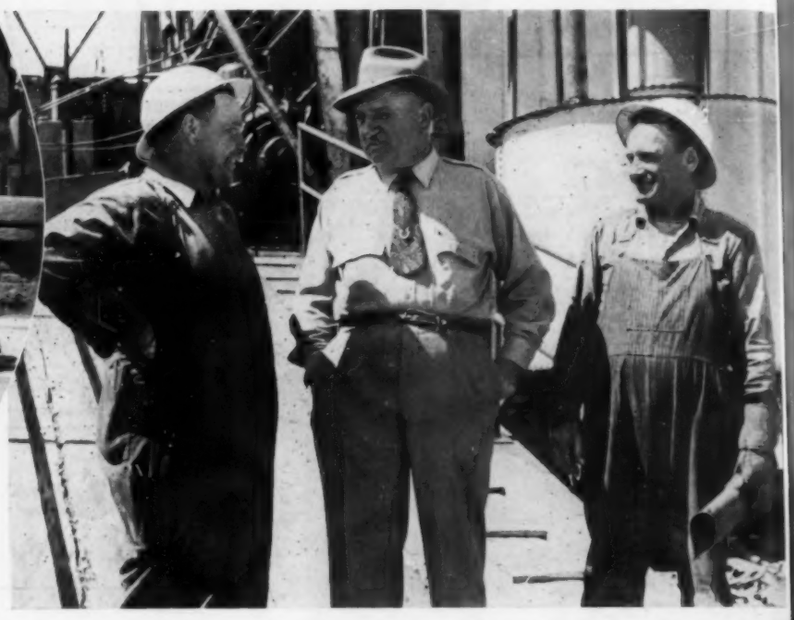
losses, a total of 115 men were employed on the well from start to finish, and of these only three, Glen Whitman, rig superintendent, and J. W. Morgan and L. H. Long, roughnecks, were continuously on the job.

Drilling continued to 1838 where the first fishing job was encouraged. This fish was quickly recovered and the hole was reamed down to 1950 and with a diameter of 17½ inches. Casing, 13⅜-inch, was then run, was then run to 1945 where it was cemented with 1600 sacks. This was on September 1. At this point was ¾ degree off verical.

Drilling was uneventful and largely routine to 4953 feet where the 5-inch drill pipe was replaced with 4-inch. A survey at 4825 feet showed the hole to be straight to that point. Two additional fishing jobs had been overcome

Left: L. H. Long, Lead Tong, and J. W. Morgan, Motor Man, Inspecting Bit that Passed World's Record Mark.

Below: J. W. Morgan, Motor Man; G. N. Whitman, Rig Superintendent and L. H. Long, Lead Tong, Member of the Original Crew Who Stayed With the Job to Completion.



inch casing was run to 6900 feet. Open hole had been drilled between the bottom of the 13⅜-inch at 1945 to the 10,000-foot marker without difficulty. The well had been shut down a comparatively minor part of the total elapsed time for repairs of a routine nature such as re-lining brakes, running new lines, repairing and adjusting the two 12-cylinder, V-type gas engines which were being operated with butane as fuel.

At 11,556 feet considerable gas was encountered under high pressure and drilling was immediately held up to recondition mud to 11 pounds. An extra blow-out preventer was installed at this time and after mud had been conditioned to 11.3 pounds at 50 viscosity coming out of the hole, drilling was resumed. A customary blow-out preventer had been installed when the operation was started, and this was later removed in favor of a double-gate control unit. At the above depth a single-control unit was added to the equipment. Drilling progressed through shale and sand interspersed with sections of black shale. At 12,085 feet a new crown block and traveling block was installed and ten lines strung. At 12,725 feet the original 7¾ X 16-inch mud pump was replaced with a 7¾ X 18-inch duplex unit and the first was retained as a standby under separate power. Later, at 12,914 feet, the 18-inch unit disconnected and an 8 X 20-inch pump put into service.

It was at 12,832 feet that the bit entered some of the toughest formation ever drilled. The first bit into the section of chert made only one foot, and the log shows a number of runs in which no increase in depth was detectable. The chert lasted for 125 feet, during which interval 148 bits were used. Average hole per bit was only a little over 10 inches. At 12,957 the chert finally gave way and three feet of hole was made in three hours. A core pulled from the well just below the chert section showed shale and broken chert. At this depth a new drawworks was installed and the power equipment to three 250 horsepower, 6-cylinder Diesels operating on fuel oil.

On March 28 of this year the well passed the former world's depth record established in 1938 by Continental Oil Company at their KCL-A2 in the Wasco field, Kern County, California, which was drilled to a total depth of 15,004 feet. Although no production was established at this total depth the well was plugged back for a good completion.

At 15,036 feet Price I ran a temperature survey with two recording thermometers which shows bottom hole temperatures of 235 and 240 degrees. At this depth around nine hours were required to make a round trip into the hole. Drilling pressure on the bit was held around 16,000 pounds.

On Thursday, May 11, a string of 5½-inch casing was run to the new record and the official depth of 15,279 feet was corrected from 15,270 feet by pipe tally. One thousand sacks of specially made cement, laboratory tested, was run in the fast time of 29 minutes under a maximum pressure of 2,800 pounds.

At total depth the well was in Simpson (Ordovician) lime and shale after topping the Ellenberger, also Ordovician and chief deep pay horizon of the West Texas area, at 15,075 feet. Plans are to perforate and test several prospective pay horizons drilled through up the hole.

Regardless of the outcome of production tests, the drilling of this well is an outstanding achievement. Operations were complicated by high pressure gas encountered at 11,556 feet, by the extremely hard 125-foot section of chert, by the extreme depths attained and by the manpower problem. There was also some time lost due to inability to obtain equipment when required and some down-time logged was due to lack of power fuel. The change from 8,000-10,000 feet equipment was gradual throughout the drilling of the well. There was no complete revision of equipment and repairs were not excessive.

The gradual evolution of all drilling and oil industry equipment during the past few years to its present excellence has materially reduced the normal hazards of deep drilling operations. Further refinement, more flexible power at less cost per horsepower-hour, and particularly the use of improved alloys expected to be introduced following the wear, will reduce these hazards even further. The major obstacle in the path of 12,000-15,000 foot exploration and development is now largely economic provided that desirable structural conditions and reserves are present.

In all there were 10 fishing jobs at the well, and one of these was charged to the water well when 12 joints of tubing dropped to total depth

of 662 feet. The only deep fish that caused trouble was at 11,639 feet where 92 feet of drill collar was dropped into the hole. This was recovered by an overshot. Earlier fishing jobs resulted from twist-offs, pipe, 680 feet of which was dropped at 2,027 feet, and cones from drilling bits.

Chemically controlled mud was used throughout the drilling of the test. At normal depths the weight was maintained at nine pounds, this being increased to 11-plus following drilling into high pressure gas. Later, the weight of the mud was again increased to 12 and 12.5 pounds; PH value was held to around 8.3 without difficulty. Care was exercised in this department and the drilling fluid never got out of control. There was no detectable loss of water, and due to holding satisfactory gel strength, the loss in weighting materials was retained at a minimum.

The complete drilling log of the well shows staking of the location on June 26, 1942 and spudding on June 30, 1942. Drilling was suspended on June 19 when hole was reamed down.

Testing, running depth survey, circulating, running casing and cementing kept the rig in operation between that time and May 11 when the last string of casing was run into the hole. Total elapsed time from spudding to this casing run was 682 days.

Drill pipe used on the tests was 5-inch to about 5,000 feet, with 4-inch past the 10,000 footmarker. From there on a 3½-inch string was used. All sizes gave adequate service in view of the demands made upon the pipe. A total of 469 bits were required in the entire operation, and 148 of these were used in the 125-foot chert section.

The record depth was achieved through overall ability. Those who supervised the drilling as well as those actually handling the drawworks, the equipment suppliers and servicing firms, are all to be complimented upon establishing this record. The well, successfully completed as a producer or not, sets a new mark in the continual advance of drilling technique.

Rotary Drilling Bit Schedule

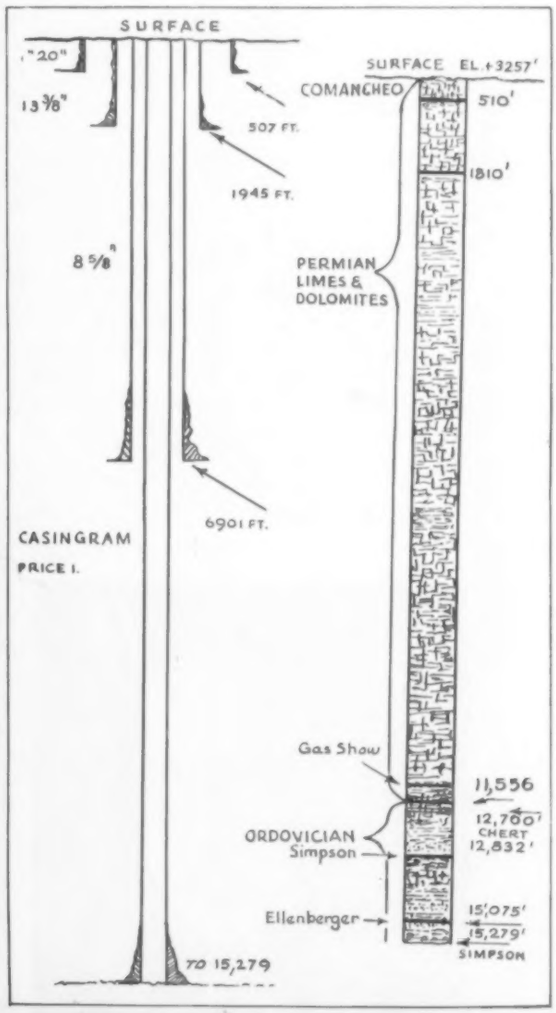
Depth Range	Hole Size	Number Bits
520-1948	12"	9
	17¼	(Reamed)
1948-6901	11	54
6901-10,008	8¾	116
10,008-12,829	7¾	106
12,829-12,954	7¾	148*
12,954-13,029	7¾	7
13,029-15,279	7¾	29
	Total	469

*(Chert Section).

Left: One of the Crews on the Record Breaking Well. Left to Right; Z. E. Aldridge, Driller; J. W. Morgan, Motor Man; J. T. Burge, Derrick Man; L. H. Long, Roughneck; R. L. Tucker, Roughneck; and Charles Ponce, Roughneck.

Below left: Heavy Duty Pump Used in Drilling Well.

Below: Formation Chart Showing Strata Drilled.



HOLMAN NEW HEAD OF STANDARD OIL

Eugene Holman

FOR the second time a Texan moves up to become the executive head of Standard Oil Company (NJ) with the election to the presidency of Eugene Holman. He succeeds Ralph W. Gallagher who has served in that position since the death of former president W. S. Farish and who now becomes chairman of the board, an office that has been vacant since the retirement of Walter C. Teagle.

Mr. Holman was born in San Angelo, Texas, in 1905 and graduated from Hardin-Simmons University at Abilene in 1916, following with post graduate study at the University of Texas from which he received a Master's degree in geology in 1917. World War I was then under way and young Holman joined the forces, serving as a Corporal in the Army Signal Corps. His first job after leaving the service was with the U. S. Geological Survey and in 1921 he went to Humble Oil & Refining Company where he rose to be chief geologist in 1926. Two years later he joined the production department of Standard Oil Company (NJ) where his work became centered on the problems of oil production in foreign countries, particularly in South America. Through his activities in this field, Mr. Holman became thoroughly acquainted with conditions in the international oil industry and in 1932 he became vice president of Pan American Foreign Corporation, a subsidiary of Standard, in charge of production, and president of Lago Petroleum, chief Venezuelan unit in the Standard organization.

In June 1940, Mr. Holman was elected to Standard's board of directors. In 1942 he became a vice president and later was made a member of the executive committee. In recent years he has had an important part in guiding the destinies of the world's greatest oil company. Through his wide experience, extensive travels and genial disposition he has made a host of friends both within and outside the oil industry and his selection as president of the company is considered an appropriate and happy choice.

Ralph W. Gallagher who releases the exacting duties of the presidency to become chairman of the board has guided the company through a difficult period when it faced the many problems and heavy demands arising from the war and has taken the lead in inaugurating new and progressive policies in dealing with the public service and public relations of the company. He commands the affectionate admiration of the company's host of employes and of all those who have come in contact with him.

At the annual meeting at which the above changes were made Frank W. Abrams, who has been a member of the board of directors since 1940 was elected a vice president. James C. Anderson was appointed comptroller to succeed Thomas C. McCobb who retains his seat on the board. All other officers were reelected.

At the same time a number of changes were made in the Standard organization. Chester F. Smith who has been president of Standard Oil Company of New Jersey resigned that position upon his election to the directorate of the holding company. Mr. Smith has been with the company for over thirty years serving most of that time in the refining division. He was made general manager of all company refineries in 1933 and became president of the company in 1940.

Another addition to the board of the parent company is Jay E. Crane who has been treasurer since 1938 when he succeeded R. F. Resor. Starting with the Commercial and Financial Chronicle in 1914, Mr Crane became associated with the newly-organized Federal Reserve Bank of New York in the credit department in 1915, becoming successively assistant cashier in charge of the foreign department and secretary of the institution.

Mr. Crane's work brought him in contact with many foreign bankers and government officials. He attended several financial conferences in Europe. In London at the time of the World Economic Conference, he took part in efforts made to stabilize the principal foreign exchanges. Much of his work in the Federal Reserve Bank dealt with operations for the United States Treasury in gold, silver, and foreign exchange.

Replacing Mr. Smith as head of Standard Oil Company of New Jersey is M. J. Rathbone who has served as president of Standard Oil Company of Louisiana since 1936.

Mr. Rathbone has had nearly twenty-three years' experience in the oil industry, all of it with Standard of Louisiana where he first went to work as a draftsman. He was born in 1900 in Parkersburg, W. Va., where his father was manager of the Standard of Jersey refinery, one of the oldest in America. Mr. Rathbone attended Lehigh University in 1921.

During more than two decades with Standard of Louisiana, Mr. Rathbone has been responsible for many of the innovations that have made its Baton Rouge refinery one of the largest integrated refining and petroleum chemical plants in the world.

During his years of association with Baton Rouge refinery, the plant, among other developments, introduced high pressure hydrogenation for large scale production of 100-octane gasoline blending agent and commercial production of butadiene and synthetic rubber.

Chester F. Smith

Jay E. Crane

M. J. Rathbone

WILL A GLUT OF OIL FOLLOW THE WAR?

WIDELY published statements regarding the "dwindling reserves" of oil in the United States and the prospect of early exhaustion of supplies have led to a general impression among the public that the shortages of gasoline and fuel oil that have prevailed since the commencement of the war will continue in the post war period, or that they will be prevented only by large imports from other parts of the world. Within the ranks of the oil industry, however, such worry as exists comes from quite the opposite cause. There it is felt that the many new plants built to meet war demands may leave the industry with excess manufacturing capacity when peace returns and that cessation of military demands for petroleum products may result in the domestic market being oversupplied during the period while the number of motor cars in use remains below normal.

Possibly both these apprehensions are exaggerated. Certainly no statistical basis can be found for predicting a lack of available supplies in the domestic market either directly after the end of hostilities or for many years following. During 1943 crude production in the United States amounted to 1,503,000,000 bbl., an average of roundly 4,120,000 bbl. per day. Yet this enormous output was sustained with a shrinkage of only 18,000,000 bbl. in the country's known reserves, according to the estimate of the Committee on Reserves of the American Petroleum Institute. At the present time withdrawals from underground reservoirs are above 4,500,000 bbl. daily and it is calculated that the rate of production may rise in the latter half of the year. It is quite possible that with the existing lack of skilled labor and materials for drilling reserves may show a further small decline at the end of 1944, but this trend will be quickly reversed whenever circumstances again favor increased exploratory activity. About the only set of conditions that could cause a serious deterioration in the reserve position in the near future would be a continuation of government control over the industry and continued enforcement of price ceilings insufficient to cover the costs of a majority of the country's producers.

Out of current production military needs of the United States and others of the United Nations absorb fully one-third according to statements from official quarters. Cessation of actual fighting will not completely end this demand but it will cause it to fall off very greatly. A minor part of the current consumption for military purposes, however, would more than suffice for the immediate needs of the reduced number of automotive vehicles and oil heating installations within the country. The decrease in the number of automobiles in use since the beginning of the war is variously estimated but according to the best information obtainable is probably in the neighborhood of 6,000,000 or approximately 22 percent of which perhaps two-thirds have been scrapped while the remaining one-third are laid up because of lack of fuel or because their owners are in military service. The latter of course can be returned to use when the war ends but the former can be replaced only as automotive plants are brought back to production for peacetime purposes and the calculations of manufacturers are that production cannot exceed 2,000,000 vehicles for the first year after the war.

A number of studies have been made of the probable course of post-war demand for petroleum products. One of these that has been generally accepted as soundly based was presented before the American Institute of Mining and Metallurgical Engineers in February last by Dr. C. L. Burrill of Standard Oil Co. (N. J.). Dr. Burrill estimated that domestic gasoline demand would amount to 1,700,000 bbl. daily in 1946 or about eight percent below 1941 requirements and that the daily demand for all oil products would be 4,200,000 bbl. in that year, rising to 5,000,000 by 1949. This calculation was based on the assumption that the war in Europe would end in 1944 and the Pacific war in 1945. If, as now appears probable, the European struggle continues into 1945, the estimates presumably would be advanced a year.

Among the fanciful pictures drawn of post-war conditions is one that portrays the air criss-crossed with the routes of commercial planes, aerial jeeps flitting like butterflies across the countryside and business men hopping from home to office and back again in private helicopters. A big increase in air travel is to be expected but men who know most about the conditions governing this development agree that it will come about very gradually. Its influence upon the consumption of gasoline can be deduced from the consideration that if all the passengers formerly carried in Pullman cars were to take to the air, plus all the individuals who are in a position to own and operate private planes, their commbined fuel requirements would not be more than 30,000 to 35,000 bbl. per day.

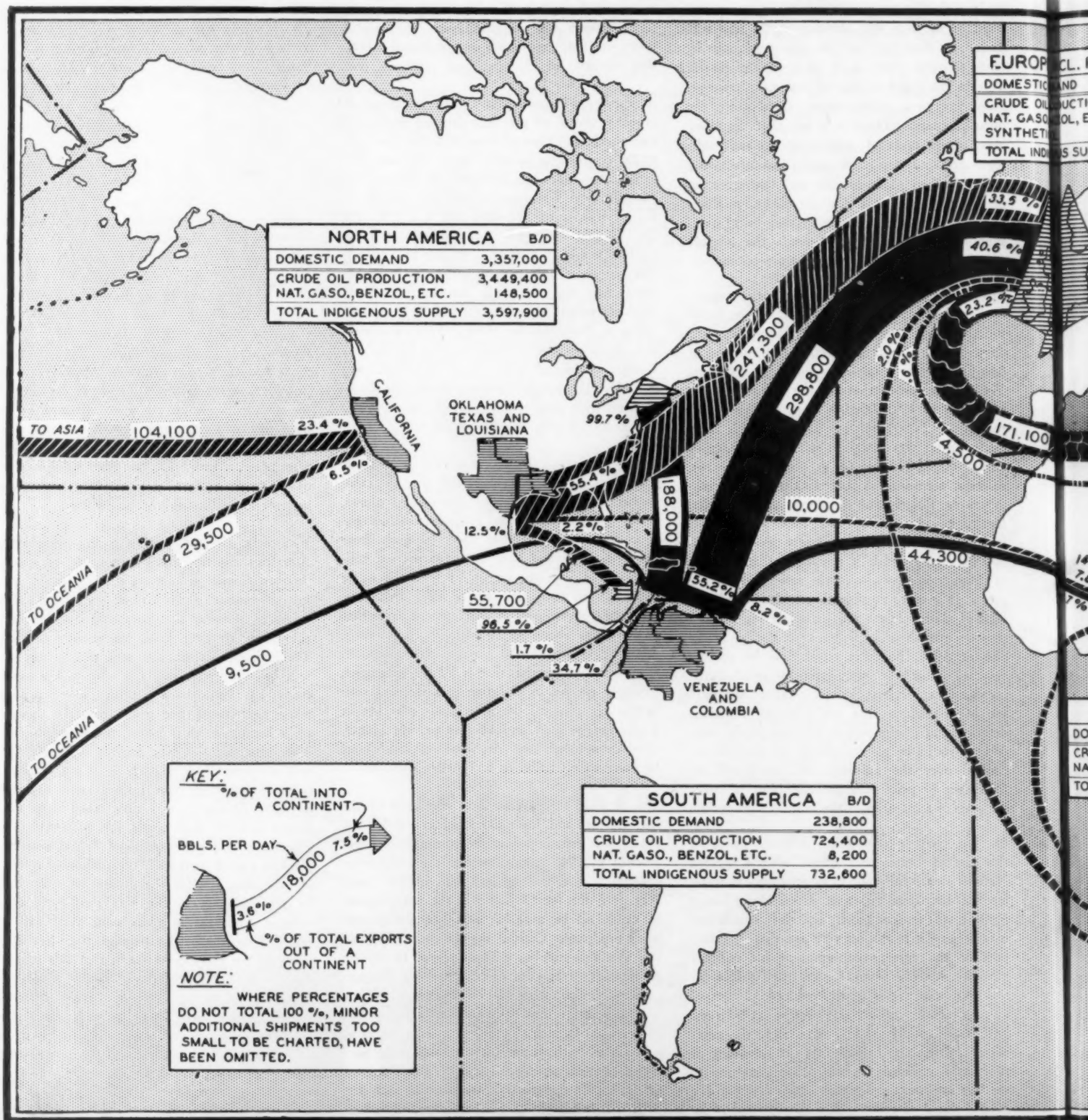
For at least three years after the close of the war the demand for motor fuel in the United States will remain below the consumption level reached in 1941 simply because the number of vehicles in use will be less than in that year. Not until the fourth year will the requirements of crude oil be as great as the quantity now being produced. Considering the country's needs and available supplies without regard to exports or imports, it appears certain that no shortage of petroleum products will be experienced. They will be in abundant supply and very possibly will be provided in such quantity as to keep prices at a low level without any intervention on the part of the government. Admittedly this state of affairs should endure only temporarily. By the fifth year after the end of the war, say about 1950, demand should rise above the 1941 level, expanding thereafter at a rate equal to or possibly exceeding the annual growth in the period preceeding Pearl Harbor. By that time the question whether the country can continue to satisfy its rising needs from its own resources may assume practical importance.

In this rough calculation of probable developments in the immediate post war period, consideration has been given only to the ability of the United States to meet its domestic requirements from its own fields and facilities without regard to exports or imports. Both exports and imports there will be however for a number of reasons. Possessing a refining capacity which has long exceeded its peacetime needs and to which has now been added the special facilities brought into existence for the war this country will be in a position to supply products needed in other parts of the world lacking in refineries or in which the equipment formerly in existence has been destroyed. An examination of the statistics of petroleum products supplied to other nations under lend-lease during the past three years or more shows that these have not differed greatly from the average quantities exported in the decade preceding the war. Because of the need that will exist such exports, on some kind of terms, will continue for some years at least after peace returns. On the other hand, imports of oil to the United States may be expected to increase in volume following the war.

Venezuela, Colombia, Mexico and other Latin American countries have been urged to expand their production in order to ease the strain upon the oil resources of the United States in the final stages of the war and are being supplied with equipment to help bring about this increase. Their oil will continue to seek this market and will be able to reach it not only to the extent that it has been opened to them under reciprocal trade agreements but even over the existing tariff because of their lower costs of production. This imported oil may provide a supply that will equalize U. S. exports or it may attain a volume that will offer serious competition to domestic producers at a time when their own output is more than ample for domestic needs. Elsewhere in the international field indications point to a great increase in oil production following the war. After the producing areas held by the Japanese in the Far East have been wrested from the invaders some time will be required to repair the damage that has been wrought but there is no doubt that this will be done with all possible speed and that it will be followed by a renewal of the development work that was under way when the war intervened. In Europe too a period of reconstruction will be necessary but Europe is a minor factor in world oil production.

One area in which the attention of all those concerned with international oil developments has

EXPORT MOVEMENTS OF CRUDE PETROLEUM ND



PREPARED BY STANDARD OIL COMPANY OF NEW JERSEY - DECEMBER 1942

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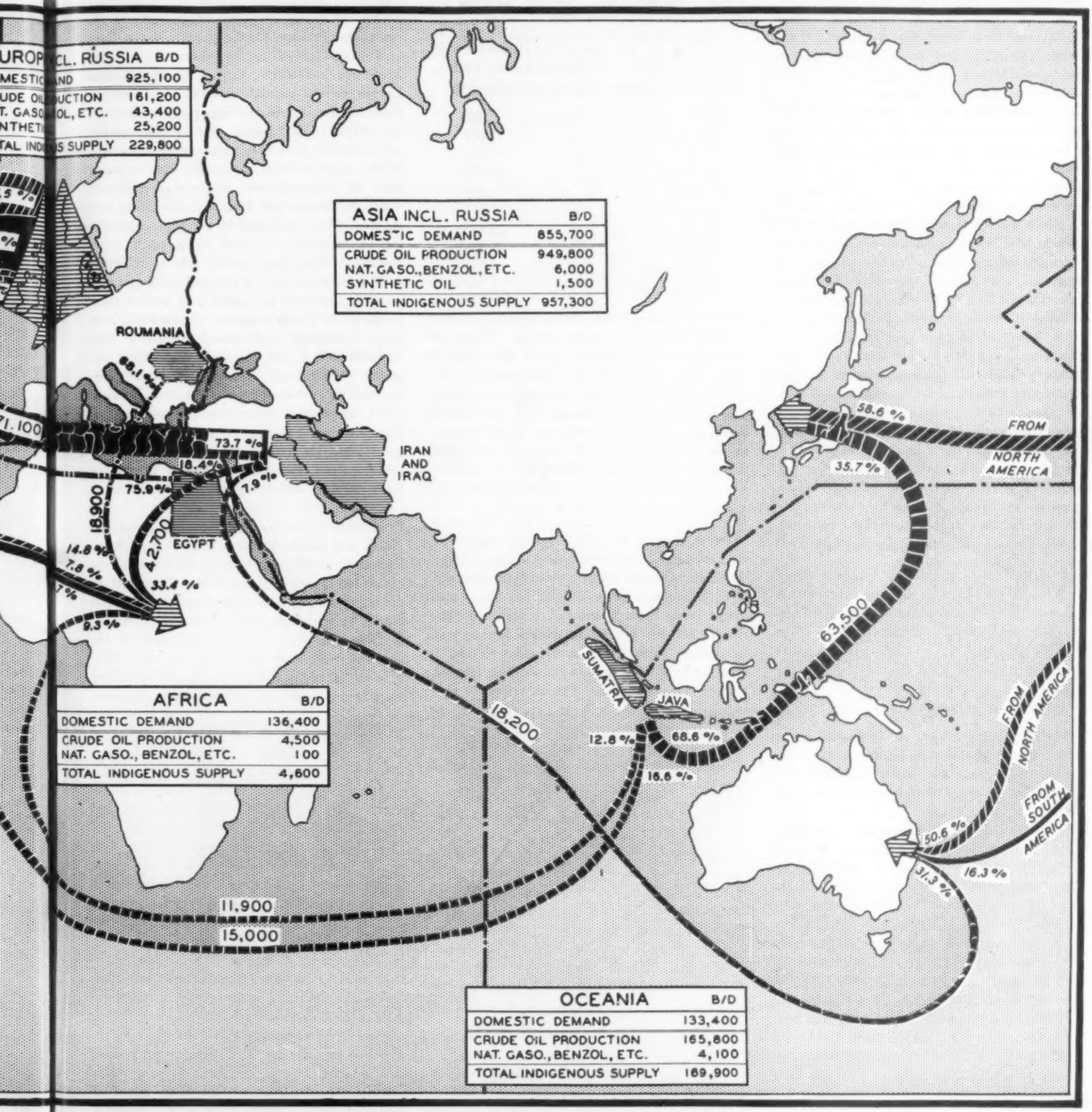


NT IN BINDING

been focussed recently and in which a very large increase in production is expected is the Middle East. This region was on the verge of great expansion when the war postponed projected activities and events that have since taken place vastly enlarge the possibilities of its influence upon world oil trade. One of the objections, from the viewpoint of other oil producing countries, to the pipe line from the Persian Gulf to the Mediterranean which the government of the United States proposed to build was the fear that it would upset the stability of international trade and possibly lead to destructive price wars. The projected line, with a capacity of 300,000 bbl. daily, would put that additional quantity of oil in a strategic position to reach southern and western Europe. Plans drawn before the onset of war for doubling the capacity of the Iraq pipe line would provide another 175,000 bbl. Iranian oil which has long held a place in European markets would not relinquish its position without a struggle by pipe line or tanker to meet any competition that offered. Altogether this might mean 600,000 to 700,000 bbl. daily of Mid-East oil delivered to the shores of the Mediterranean which, when added to Romanian and possibly some Russian exports, would be just about enough to supply the normal needs of Western Europe. Because of its advantageous position this oil from the east would be competitively stronger as compared with shipments from the other side of the Atlantic and might be able to force American oil out of the market. Whether or not conditions take this course the possibilities of a temporary oversupply of oil in the years directly following the close of the war and a consequent period of severe competition are foreshadowed.

Back in 1938, the last full year before the start of World War II and the latest for which authentic statistics are available, the export-import movement of oil was calculated at about 850,000 bbl. daily. This figure is not exact because it includes only shipments from the larger producing countries and receipts by consuming nations with substantial requirements.

Of the exporting countries the United States in 1938 held the leading position as had been the case for many years previously. Other large exporters in the order of their importance were Netherlands West India, Netherlands India, Iran, Romania, Iraq, Venezuela, Colombia, Mexico and Russia. The shipments of these nations for the year named in thousands of barrels were as follows:

Country	Bbl.
Venezuela	178,780
Netherlands West Indies	164,783
United States	83,368
Iran	69,111
Netherlands India	45,026
Romania	34,236
Iraq	30,955
Colombia	18,453
Mexico	13,714
	638,426

Of the countries mentioned above Netherlands West Indies is not a producer of oil but the large refineries located on the islands of Aruba and Curacao process a large part of the crude from Venezuela and Colombia. Consequently the exports from these islands represent a duplication of figures for the other countries. Shipments from the other countries represent oil produced within their borders.

On the import side the principal users of oil products with the quantities imported in 1938 in thousands of barrels included the following:

Country	Bbl.
United Kingdom	77,608
France	55,653
Germany	47,758
Canada	31,679
United States	22,447
Japan	21,655
Italy	18,354
Netherlands	12,034
Argentina	6,797

The main lines of trade in petroleum were fairly well defined in this pre-war period. Crude oil imported into the United States and Canada came from the Caribbean area, mainly from Venezuela and Colombia. Moving in the opposite direction refined products from the United States supplied a substantial part of the requirements of non-producing countries in Latin America. The Western Hemisphere as a whole was self-sufficient and in addition was a large exporter to other parts of the world.

Western Europe, lacking indigenous supplies of any substantial importance and being a large consumer, drew its imports both from East and West. Products from the United States and Netherlands West Indies had a wide distribution in all this area while central Europe was fed largely from Romania. Iranian oil had a share in the British market and in those reached via the Mediterranean. French refineries provided an outlet for a large part of the crude from Iraq while Germany and Italy took a major share of Mexico's crude exports under special trade agreements with the government of that country.

East of the Suez lay a separate division of the international oil domain with its own sources of supply for the countries bordering the Pacific and the Indian oceans. Oil from Iran and from Netherlands India held a leading place in this part of the world with Bahrein and Saudi Arabia beginning to be a factor. Japan obtained a large part of its supply from the Pacific Coast of the United States, supplemented by receipts from the East Indies, Sakhalin and shale deposits in Manchuria.

It is in this part of the world that a tremendous increase in potential oil production is in prospect for the post-war period. Existing fields in the Middle and Far East have not been produced to anything like their full possibilities while the development of new sources of supply, underway in many parts of the region at the beginning of the war, necessarily will be pushed forward at its conclusion. It was the realization that production in the East might quickly exceed the needs of its normal markets that caused apprehension in trade circles when it was announced that the government of the United States planned to construct a pipe line across the Arabian peninsula that would divert a large flow of Persian Gulf oil to the eastern shore of the Mediterranean within easy reach of Western Europe to the possible disturbance of former trade relationships in that important market and the virtual elimination of oil from the western side of the Atlantic from its competitive position. Within Europe itself production has increased since the commencement of the war with two countries, Austria and Hungary, advancing to a position which will enable them to enter the list of exporters, at least on a small scale. Romania's fields may not be able to maintain their former output but renewed drilling activity with improved equipment may restore their position. In Russia a number of new fields have been discovered and though Russia's own demands will be exceedingly heavy during the period of industrial reconstruction it may seem desirable to export substantial quantities of oil in order to obtain other needed commodities. Europe's need for petroleum products will be great after the return of peace but Europe's ability to use them and its capacity to pay for them certainly will be limited for some time.

Production in the Western Hemisphere, both in North and South America, will be at a record high level at the conclusion of the war and the broadened search for new fields, stimulated by the war itself, may be counted upon to maintain output at this high level. Demand, according to those who have given careful study to the question, will experience a decided lag while adjustment to peacetime conditions is taking place before it resumes its former upward course.

Consideration of all these factors leads to the conclusion that world oil production will be at a new high level in the period directly following the war. That consumption will increase also is to be expected but some time will be required before demand can resume even its normal peacetime rate. In the interim active efforts will be put forth by producing interests to reestablish their position in marketing areas that have been closed to them and countries with expanded supplies will strive no less energetically to find outlets for their surplus. Extremely sharp competition in the international field appears inevitable and this may lead to serious price wars unless some form of agreement concerning production and distribution is arrived at. This is a phase of the situation that should receive the attention of those representatives of government and industry who are working on plans for a world agreement that will aid in the conservation and orderly development of oil resources.

DEVELOPMENT OF SOVIET OIL SPEEDED DESPITE WAR HANDICAP

By Lily Turner

Scorched Earth Areas in Caucasus Resume Production While Great Expansion has Taken Place in Newer Fields of Urals and Central Asia

ONLY two years ago the high tide of the Nazi invasion of southern Russia had engulfed part of the oil fields of the North Caucasus and had reached almost to the shore of the Caspian Sea, dangerously imperiling 80 percent of the Soviet Union's oil supply. Today that seems like ancient history for the sweep of the victorious Red army has driven the invaders out of Soviet territory and has left the westernmost of the Russian fields far to the rear. Long before the advance reached its present position however—in fact almost as soon as the Caucasus was released—the oil fields were being restored and had resumed production.

When Maikop and Grozny were put out of commission by the Russians in the face of the German advance, apprehension was felt in other countries that the oil supply of the Soviet Union would be seriously hampered and that of the Nazis increased. However, in the face of the loss of these two excellent oil producers, the Russian oil supply continued almost sufficient, though not quite, for the vastly increased war and production needs of the country.

Two factors were involved in this. For almost twenty years before the German attack upon the Soviet Union, that country had been increasing its oil output until it stood second only to the United States in production. This had been done in two ways: by increased efficiency in the working of old wells, and by the discovery and working of new areas, principally those of the Urals, but also fields in Central Asia, Siberia and within the Arctic Circle.

Maikop and Grozny were empty victories for the Germans. Although in 1941, these two fields produced 30,000,000 barrels of oil—almost sufficient to supply Germany's oil deficiency—the Nazi war machine did not benefit from their capture. The fields were wrecked so completely and thoroughly that the Russians themselves, in most cases, found it more practical to drill new oil wells to resume quick production than to attempt to repair the old ones.

During the German occupation of more than six months, the Hitlerites were unable to get a single barrel of oil in spite of the shipment of several million marks worth of equipment and supplies to the area, together with the teams of technicians and engineers. Maikop is a field of shallow production. "Ordinarily, it takes only four to six weeks to sink new wells in the easily accessible beds. The Germans found it impossible to do this because of the organized sabotage of the oil workers and the local guerillas. Two thousand of the oil workers took refuge in the forests during the German occupation and systematically made daring raids on the fields.

Now these oil workers, together with those who had been evacuated to the Ural fields, have returned and are gradually bringing Maikop and Grozny back to pre-war production norms. Before the war Maikop was responsible for seven percent of the oil of the Soviet Union or between 15,000,000 and 17,000,000 bbl. per year, while the whole North Caucasus produced around 15 percent of the country's total output.

Thousands of returned inhabitants of the neighboring farms and villages have flocked to the oil fields to help reconstruction. In order to use them effectively in achieving quick production, a new system of training unskilled and semi-skilled workers has been devised to bring them up to the skills of drillers and operators. These men and women have been put into 10-hour a day study-work groups at regular wages.

The first task of former oil workers was to dig up the tools, parts and even machine tools that had been cleverly concealed at the time of evacuation.

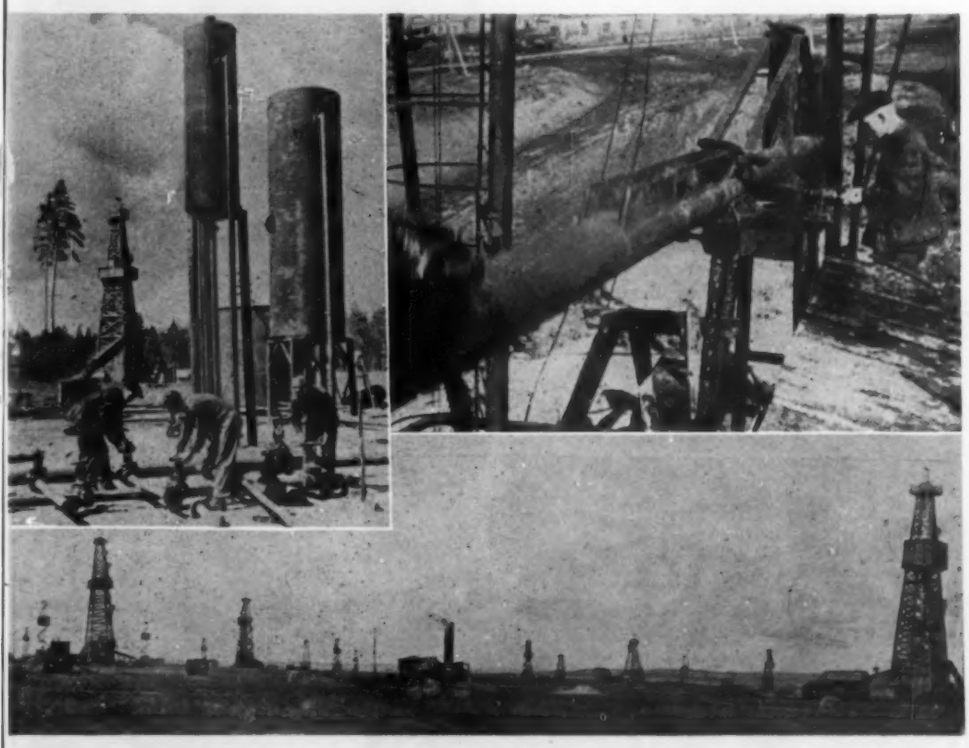
Even before the Nazi thrust across southern Russia reached a point where it threatened the whole of the Caucasus systematic efforts were put under way to increase production in the Ural region where large deposits were known to exist. As the invasion rolled further eastward these activities were redoubled. Nevertheless had the drive of the German forces enabled them to establish themselves on the shores of the Caspian and to capture or cut off the entire Epsheron peninsula it would have been a major disaster for the Baku district was still the main source of Russian oil supply. Fortunately the onslaught was checked on the very threshold of its principal objective but its failure did not lessen the determination of Soviet authorities to push the development of safe and diversified sources of supply in various eastern areas.

It is the fields east of the Urals which have been the object of special attention since 1941 and they have contributed much to strengthening the oil sufficiency of the Soviet Union. As early as 1938, these fields, called the new Baku, yielded over 7,000,000 bbl. of oil, 4.3 percent of the total output of the USSR. In 1942, its production was 98,000,000 bbl. with new wells being brought in constantly. Figures for 1943 are not available, but percentage reports show that there was an over-all increase in production of 25 percent with the production of some of the fields standing at one-and-one-half times the previous year.

In addition, the fields east of Kuibyshev, whose 1939 production was 40,000 barrels a day, and

Production Activity in the Areas Between the Volga and Urals.

Pipeline in the Ishembaev Field.



The "Second Baku" Between the Urals and the Volga.

1941 production 27,500,000 barrels, increased in 1942 to 40,000,000 barrels. This oil, quite near the surface, at about 250-300 meters, is piped from Perm to Ufa and is moved by railroad connection to the industrial centres of the Upper Volga and the Ural Mountains. The most recent report, in February of this year, is that this region trebled its pre-war production, exceeding that of Emba in Kazakhstan. Drilling can be done without casing the bore-holes, pipeless wells going as deep as 1000 feet.

In the Caspian region, at Emba, the production in 1941 was 4,500,000 barrels, with substantial increases in the following two years. For instance, the refineries at Orsk have a capacity of 28,000 barrels a day. In 1942, production was only 12,000 barrels daily. A 12-inch pipe line, 435 miles long, runs from the Emba fields along the coast of the Caspian Sea. By 1939, it was estimated that the Kazakh Republic alone contained nearly one-third of the oil deposits of the Soviet Union.

Russian oil production in 1913 was 9,200,000 tons (65,000,000 bbl.) By 1937 it had tripled to about 30,500,000 tons. By 1940, production was 625,000 barrels a day. In the following year, there was a 10,000,000 barrel increase over the previous year, bringing the total to 238,000,000 barrels. While the old fields were still producing, much of this increase was due to the discovery and working of new fields.

By 1939, it was already known that the Soviet Union contained 3,877,000,000 cubic tons of proved deposits, 55 percent of the known oil deposits of the world. At the same time, the figure of geologic oil deposits was 6,376 million tons. Some 55,000,000 metric tons of oil shale are in reserve, their specific oil content being undetermined. Production from shale for 1942 was 28,000,000 bbl.

Up in the Arctic Circle, on the Pechora taiga, at Oukhta, oil had been discovered some years back but development was hampered because of the competition of the older fields. In 1931, the Soviet Union began to develop this northern field. On the Pacific, oil was discovered in Kamchatka. The oil of the northern half of Sakhalin Island was sent down the Amur River to new works in Khabarovsk where primary distillation is combined with the cracking process.

The Fergana Valley in Central Asia, including parts of the Uzbek, Tadjik and Kirghiz Republics, was discovered to contain oil. South of Krasnovodsk lies the oil region of Nebit-dag (Central Asia) where some of the oil springs have flowed as much as 2,000,000 bbl. of oil. The last two years have seen tremendous increases of production and efficiency in all these supplementary fields.

During this whole period, the grand-daddy of Russian oil fields, Baku, kept right on producing. This field has been worked now for 65 years. In addition, in order to effect wartime economy, during 1942, the most difficult period, the Baku wells got along without new equipment. Old tubing and metal from unused pipelines was salvaged and put into use. Leather was substituted for steel in certain pumps. In this way 13,000,000 rubles was saved on industrial equipment alone. The area also undertook, and fulfilled, the production of munitions and rifles. And, in 1943, in Azerbaijan, of which Baku is one city, new fields were opened up. These are producing quantity as well as quality, being particularly notable as a source of high octane gas.

Toward the end of 1943, an exhibit was held in Baku which demonstrated the extraordinary inventiveness of the Baku production workers in overcoming wartime difficulties. Engineer Buzdakov collected three and a half tons of valuable super-hard alloy from outworn, mutilated chisels, which resulted in new high-speed cutting instruments for factory use. Also exhibited was a bynamograph—a sort of window into the bowels of the earth through which everything is visible to a depth of over half a mile. The instrument is of simple construction, linked up with a pump sunk into a pit, providing a complete report on which is taking place down below. The instrument produces graphs which plot causes and areas of disorder. New scrapers have been devised which cleanse the pipes of paraffin without having to raise them to the surface.

During 1942-43, 3,860 rationalization suggestions and inventions proposed by Baku engineers, technicians and workers in the oil fields have effected economies of 50,000,000 rubles.

One of the new towns on the Urals, Krasnokamsk, set up as a paper mill town, presents a curious appearance. Shortly after the town was established, it was decided that more water was needed. An artesian well was begun. Oil was struck in the course of the digging and began spouting in good earnest. The result is that oil derricks dot the town, springing up at crossings, at the entrance to a large apartment house and even in yards and gardens. Krasnokamsk continues to turn out paper but it is a true oil town now.

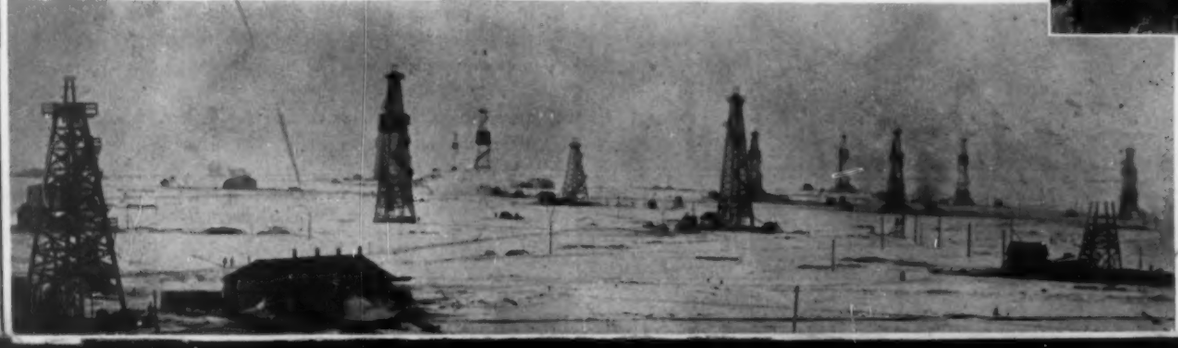
In a recent report by Oil Commissar L. Seden comparisons are given of production by oil combines operating in some of the newer areas during the first half of 1943 as compared with the corresponding period of 1941. These figures show the output for the half year of 1943 in percentages of 1941 production as follows:

Oil Combines	*Percent*
Burgurusian and Kivel	472
Kuibyshev	220
Kazakhstan	125.7
Molotov	113.7
Kalinin (Fergana)	117.5
Far East	112.6

Russia's needs for oil to carry out the great program of post war reconstruction and industrialization will be greater than ever before. The increased supplies made available from the wartime development of these newer areas will be of great assistance in carrying out these plans by making petroleum products available at many points within the Soviet Union.

Skidding a Derrick in the Krasnokamsk Field.

View of the Syzran Fields.

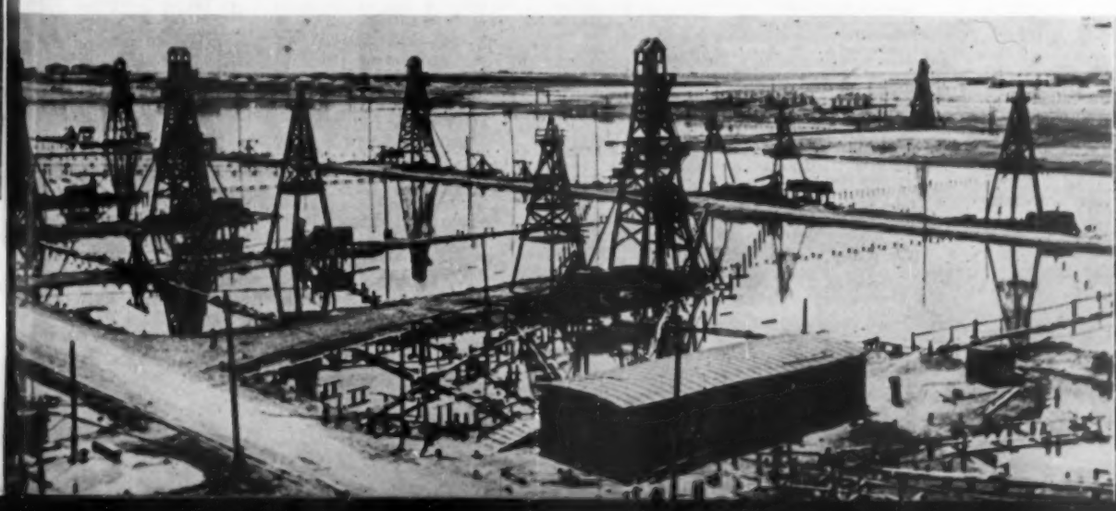


Right: Oil Wells at Emba-Nefti.

Extreme Right: Preparing to Set Casing in One of the Newest Fields.

PRINT IN BINDING

OIL FIELDS IN U.S.S.R.
Gulf of Bothnia
FINLAND
KARELO-FINNISH S.S.R.
White Sea
ARCTIC CIRCLE
Pechora R.
PECHORA
Baltic Sea
HELSINKI
Gulf of Finland
TALLINN
ESTONIAN S.S.R.
LENINGRAD
Ob R.
Irtysh R.
Sukhona R.
RIGA
LATVIAN S.S.R.
LITHUANIAN S.S.R.
KIROV
BERESNIKI
(PERM)
MOLOTOV
TOBOLSK
Tavda R.
VILNIUS
MINSK
VITEBSK
SMOLENSK
MOSCOW
GORKI
Oka R.
SVERDLOVSK
OMSK
WHITE RUSSIAN S.S.R.
KAZAN
Kama R.
KURGAN
CHELYABINSK
GOMEL
UFA
ULYANOVSK
BUGURUSLAN
KUIBYSHEV
(SAMARA)
PENZA
SIZRAN
MAGNITOGORSK
Tobol R.
KUSTANAI
LWOW
KIEV
KURSK
VORONEZH
UKRAINIAN S.S.R.
SARATOV
CHKALOV
(ORENBERG)
ORSK
KARAGANDA
KHARKOV
URALSK
KISHINEV
Don R.
Volga R.
Ural R.
AKTYUBINSK
KAZAKH S.S.R.
ODESSA
STALINGRAD
ROSTOV
Sea of Azov
DOSSOR
Emba R.
CHAPAYEV
EMBA
SEVASTOPOL
KERCH
ASTRAKHAN
Black Sea
TUAPSE
MAIKOP
Syr Darya
Lake Aral
GROZNI
MAKHACH KALA
UZT-URT PLATEAU
UZBEK S.S.R.
TASHKENT
BAIUM
GEORGIAN S.S.R.
Caspian Sea
FERGHANA
KIRGHIZ S.S.R.
TURKEY
AZERBAIDZAN S.S.R.
BAKU
KRASNOVODSK
BUKHARA
TADZHIK S.S.R.
STALINABAD
TURKOMEN S.S.R.
IRAQ
IRAN
TEHRAN
WORLD PETROLEUM MAP



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Moreover, the profit betterment is in face of governmentally imposed price ceilings and other war restrictions affecting all divisions of the industry from the production of crude oil to the marketing of the finished products.

The task of supplying military and essential requirements of the United Nations is the dominating one in current operations, and will be so long as the war continues. Besides the processing of usual oil products and high octane aviation gasoline, the industry is turning out many special war products, such as alcohols, solvents, ammonia, glycerine and numerous other chemicals; also toluene, the base for trinitrotoluol and butadiene, the essential ingredient in synthetic rubber.

Peak demand for products is reflected in crude oil production and in refinery operations, both at record levels. Crude output in the United States in the first four months of this year approximated 535 millions barrels, an increase of 15 percent over the 466 million barrels produced in the corresponding period of 1943. Refineries processed approximately 524 million barrels of crude oil in this year's first months, a gain of 20 percent over the 437 million barrels run to stills in the similar period a year ago.

But war's appetite for oil products has not been surfeited by the high rate of refinery activity. It has been necessary, in addition, to dip into stocks previously accumulated, especially of heavy fuel oils. As of recent date (February 27, the latest for which complete figures are available), the inventory of refined products was 236,293,000 barrels, the smallest in years. It compared with 242,292,000 barrels at the end of 1943, and 260,510,000 as of February 28, 1943. Just before Pearl Harbor the stock position stood at 306,566,000 barrels.

Heightened activity of the industry permitted sharp gains in profits in this year's initial quarter. The first 20 companies to issue reports for that period showed net profits aggregating $53.4 million against $40 million a year ago, an improvement of 33.5 percent. In fact, were at the highest level in the March quarter for sometime past. Comparing with the last peacetime March quarter, in 1941, this year's profits of the 20 companies were up 65 percent with many company showing over 100 percent gains.

A few companies were benefited in this year's first quarter by special situations. These included Houston Oil and Texas Pacific Coal & Oil Co., both with sizable stakes in West Texas where, in recent months, construction of transportation facilities has opened new markets for their crude oil production.

Companies operating on the Atlantic coast also fared much better this year in reflection both of an improvement in transportation and the lack of a ban on pleasure driving (in the early months of 1943 a strict ban on pleasure driving obtained). Such companies as Atlantic Refining, Shell Union, Tide Water and Texas reflected these improvements this year.

Profit showings of solely producing companies, on the other hand, were mixed. Amerada Petroleum reported a sizable gain in profits in the March quarter against a year ago; Barnsdall registered only moderate improvement, while Plymouth Margay and Seaboard had small reductions. Partly responsible for the curtailment in profits by some producing companies is the fact that drilling this year is at a greatly expanded rate and expenses therefore are charged directly to current operations, thus reducing profits.

In addition, acreage acquisitions by some companies have been higher than normal, especially in the southeastern area of the country where heightened oil exploration prevails. The normal procedure with some companies is to charge these off as required. If the lands prove productive they are then capitalized, but meanwhile they are expensed to the detriment of earnings.

In the tabulation below is shown the net income and per share earnings of 20 companies to report for the March quarter of this year with comparisons for similar periods in 1943 and 1942:

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As the industry enters the third and fourth quarters, however, there will be a leveling off as compared with a year ago and profits, barring an upward revision in prices, will tend to flatten out. The sharp spurt in the industry's operations had its beginning in the third quarter of last year, with both production and refinery activity moving up sharply.

For the full year 1944, hence, the indications are that profits of the oil industry, as a whole, will show only a moderate increase over those for 1943 in spite of the greater volume of business.

For the 23 leading American oil companies used in World Petroleum's annual financial review, net profits in 1943 aggregated $539,260,000, an improvement of 27.7 percent compared with the $422,042,000 netted in the previous year, but a reduction of about three percent compared with 1941 when earnings totaled $554,044,000.

Thus, notwithstanding a new record in volume of business transacted in 1943, profits were 11 percent below the peak of $607,407,000 attained in 1937 when crude production was 14.5 percent less than in 1943.

War taxation, higher labor and material costs, and the imposition of ceiling prices by the government, were chiefly responsible for the failure of profits to parallel, or even surpass, those of 1937.

Last year's net profits for the 23 companies were equal to $2.72 a share of combined common stock outstanding, after allowing for preferred

Net Profit and Per Share Earnings for 20 Representative Companies

(Three Months Ended March 31)

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	Net Income	A Share	Net Income	A Share	Net Income	A Share
Amerada Petroleum	$ 1,454,425	$1.82	$ 944,221	$1.20	$ 689,287	$ .89
Atlantic Refining	4,158,676	1.51	1,333,584	.45	2,747,510	.98
Barnsdall	946,714	.43	896,556	.40	486,569	.21
Continental	3,206,826	.68	3,335,475	.71	1,215,582	.26
Houston Oil	717,302	.53	372,261	.22	423,280	.26
Lion Oil Rfg.	294,431	.68	253,510	.58	125,574	.29
Margau Oil	75,594	.50	107,729	.72	30,644	.21
Ohio Oil	3,954,573	.60	3,124,029	.46	1,933,772	.22
Phillips	3,713,011	.76	3,597,334	.80	3,307,892	.74
Plymouth	525,258	.51	548,512	.52	245,806	.24
Seaboard	454,726	.37	495,098	.40	264,358	.21
Shell Union	6,806,358	.51	5,067,188	.39	3,621,794	.28
Skelly Oil	1,754,359	1.78	1,231,925	1.25	898,917	.91
Standard (Cal.)	7,822,607	.60	6,410,246	.49	4,799,184	.37
Texas Co.	11,878,754	1.06	8,029,000	.74	6,600,000	.61
Texas Gulf	92,288	.10	96,855	.11	99,387	.10
Texas Pac. Coal & Oil	428,254	.48	220,336	.25	195,597	.22
Tide Water	3,580,018	.47	2,656,797	.33	2,859,950	.36
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Significantly, in line with the improvement in profits last year, the American oil industry, as a whole, made progress in bettering its financial status. Working capital was increased and funded debt was reduced moderately. Moreover, in expectation of post-war adjustments, such as possible inventory adjustments, and for other unforeseen contingencies, the industry has been setting up reserves.

Fortunately the industry will not be faced with huge expenditures for reconversion to a peace-time basis. In fact it will have relatively little expense in returning to normal peace-time operations and, hence, is better situated in this respect than most other industries.

For the 23 companies working capital was lifted to $2,085,804,000 at the end of 1943, the highest in years, and an improvement of $152,120,000 compared with a year earlier. Only eight of the companies showed reductions and in most instances this was because of debt repayment, the acquisition of properties, or expansion of facilities without recourse to outsde borrowing.

Cash position of the industry was unusually strong at the year-end since, for the most part, inventories continued to be drawn upon in order to meet the extraordinary demand for products and converted into cash. Actually the reduction in refined products inventories last year amounted to 20,759,000 barrels. This reduction was partly offset by an increase of 6,800,000 barrels in stocks of crude oil above ground.

Twenty of the 23 companies had funded debts aggregating $1,032,655,000 at the close of 1943. This was a reduction of $26,443,000 for the same companies from a year earlier.

Since December 31, last, Phillips Petroleum Co. has sold $40 million of debentures, utilizing the proceeds to repay $14.5 million of long term notes payable and adding the remainder to its working capital.

Union Oil Co. late last year entered into an agreement with a group of banks to borrow funds to finance the purchase of properties in Montana Glacier Production Co. The transaction has not yet been concluded, pending determination of price, and the actual bank loan has not been consummated.

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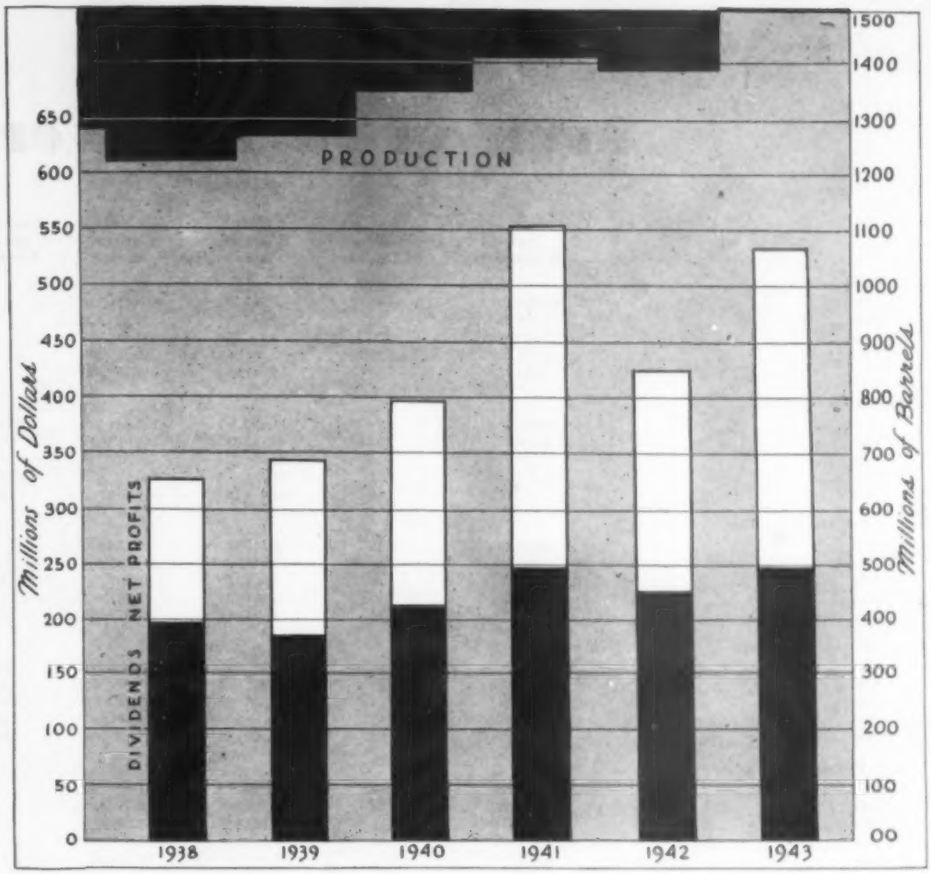

Profit and Dividend Trend for 23 Representative Oil Companies over the Past Six Years

Sinclair Oil Corp. (formerly Consolidated Oil Corp.) made several important changes in its debt position last year. The remaining 3¾ percent debt due in 1950 was redeemed, and a reduction made in first preferred ship mortgage notes outstanding. Total long term debt of the company stood at $66.8 million at the close of 1943, a reduction of $28,396,109 during the year. Besides the debt, however, Sinclair listed loans and advanced by the government outstanding of $25,655,819 as of December 31, last, all made in connection with the construction of facilities for the production and transportation of crude oil and products required in the war. In February of this year one of these government loans was reduced by an instalment payment of $2,143,800.

Debt changes for other companies during 1943 were relatively small, and are indicated in the five-year financial tabulation accompanying this article.

Several of the larger companies made purchases of properties last year, principally producing properties of smaller independent operators. Outstanding purchasers were Atlantic Refining Co., Gulf Oil, Shell Oil, Standard of Indiana through a subsidiary, Phillips Petroleum, Sinclair, Barnsdall, Standard of N. J. through a subsidiary, Standard of Ohio, Tide Water and Texas Co. Moreover, Standard of Ohio which, heretofore, had been principally a refiner and marketer, began aggressive development of producing properties. In spite of a 27.7 percent gain in profits last year by the 23 leading American companies, cash dividend payments on their common shares, in the aggregate, were only slightly more than 10 percent higher at $249.4 million as compared with the $224.8 million disbursed on equity shares in 1942. Last year's dividend payments were almost on a par with those paid out in 1941—248.6 million. In relation to net profits the companies disbursed a little more than 40 percent against better than 50 percent in the previous year.

Of the 23 companies, twelve disbursed larger cash dividends in 1943 than in the previous year. The remainder paid at the same rate as in 1942.

Standard Oil Co. (N. J.), in the latter group, however, also distributed its holdings in Consolidated Natural Gas Co. (successor company to five natural gas companies which it owned) to its stockholders in the ratio of one share for each ten shares of Jersey owned. The cash dividend paid by Standard (N. J.) was $2 a share, entailing a distribution of $54.5 million, the largest for the American companies.

Larger cash distributions on common stock were made last year by Atlantic Refining which paid an aggregate of $1 a share against 70 cents in 1942; Barnsdall 80 cents against 60 cents; Ohio Oil 75 cents against 50 cents; Pure Oil 75 cents against 50 cents; Shell Union $1.25 against $1; Standard of Ohio $2.50 against

(Continued on page 56)

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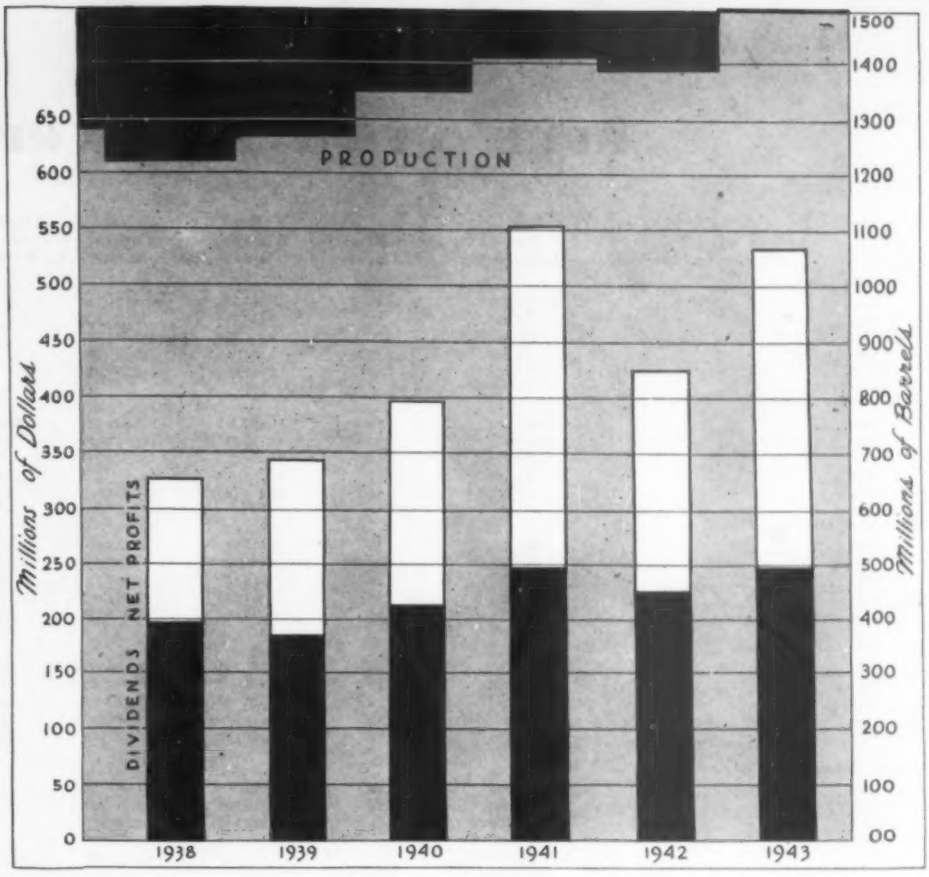
Union Oil Co. late last year entered into an agreement with a group of banks to borrow funds to finance the purchase of properties in Montana Glacier Production Co. The transaction has not yet been concluded, pending determination of price, and the actual bank loan has not been consummated.

Ohio Oil Co. bettered the position of its equity holders last year by redeeming the remaining outstanding six percent preferred stock, without recourse to outside borrowing. In fact, the serial bank debt of the company was reduced to $11 million in February of this year by the payment of $1,500,000 against the serial which would not have been due until February, 1945.



Profit and Dividend Trend for 23 Representative Oil Companies over the Past Six Years

Sinclair Oil Corp. (formerly Consolidated Oil Corp.) made several important changes in its debt position last year. The remaining 3¾ percent debt due in 1950 was redeemed, and a reduction made in first preferred ship mortgage notes outstanding. Total long term debt of the company stood at $66.8 million at the close of 1943, a reduction of $28,396,109 during the year. Besides the debt, however, Sinclair listed loans and advanced by the government outstanding of $25,655,819 as of December 31, last, all made in connection with the construction of facilities for the production and transportation of crude oil and products required in the war. In February of this year one of these government loans was reduced by an instalment payment of $2,143,800.

Debt changes for other companies during 1943 were relatively small, and are indicated in the five-year financial tabulation accompanying this article.

Several of the larger companies made purchases of properties last year, principally producing properties of smaller independent operators. Outstanding purchasers were Atlantic Refining Co., Gulf Oil, Shell Oil, Standard of Indiana through a subsidiary, Phillips Petroleum, Sinclair, Barnsdall, Standard of N. J. through a subsidiary, Standard of Ohio, Tide Water and Texas Co. Moreover, Standard of Ohio which, heretofore, had been principally a refiner and marketer, began aggressive development of producing properties. In spite of a 27.7 percent gain in profits last year by the 23 leading American companies, cash dividend payments on their common shares, in the aggregate, were only slightly more than 10 percent higher at $249.4 million as compared with the $224.8 million disbursed on equity shares in 1942. Last year's dividend payments were almost on a par with those paid out in 1941—248.6 million. In relation to net profits the companies disbursed a little more than 40 percent against better than 50 percent in the previous year.

Of the 23 companies, twelve disbursed larger cash dividends in 1943 than in the previous year. The remainder paid at the same rate as in 1942.

Standard Oil Co. (N. J.), in the latter group, however, also distributed its holdings in Consolidated Natural Gas Co. (successor company to five natural gas companies which it owned) to its stockholders in the ratio of one share for each ten shares of Jersey owned. The cash dividend paid by Standard (N. J.) was $2 a share, entailing a distribution of $54.5 million, the largest for the American companies.

Larger cash distributions on common stock were made last year by Atlantic Refining which paid an aggregate of $1 a share against 70 cents in 1942; Barnsdall 80 cents against 60 cents; Ohio Oil 75 cents against 50 cents; Pure Oil 75 cents against 50 cents; Shell Union $1.25 against $1; Standard of Ohio $2.50 against

(Continued on page 56)

FIVE YEAR FINANCIAL REVIEW OF

	Net Income	Per Share of Com.	Net Working Capital	Net Capital Assets	Funded and or Long Term Debt	No. of Pref. Shares	No. of Com. Shares	Surplus
Amerada Corp.								
1943	$4,781,771	$6.06	$8,615,413	$13,434,753	.....	.....	788,675	$10,665,707
1942	3,271,885	4.15	5,542,107	12,714,027	.....	.....	788,675	7,461,287
1941	2,569,560	3.26	3,473,258	12,682,721	.....	.....	788,675	5,766,751
1940	1,775,734	2.25	3,124,396	12,016,406	.....	.....	788,675	4,774,541
1939	1,230,764	1.56	3,047,353	11,801,630	.....	.....	788,675	4,576,157
Atlantic Refining Co.								
1943	10,687,828	3.79	44,630,707	180,655,671	$32,632,928	148,000	2,663,998	105,669,359
1942	6,800,002	2.33	53,403,548	158,643,694	26,305,709	148,000	2,663,998	96,943,179
1941	14,346,229	5.16	44,036,326	161,670,211	25,024,849	148,000	2,663,998	92,643,137
1940	6,217,453	2.11	45,152,518	145,997,524	25,124,849	148,000	2,663,999	80,629,957
1939	5,032,282	1.66	42,408,126	144,784,942	25,249,849	148,000	2,663,999	78,053,554
Barnsdall Oil Co.								
1943	3,602,764	1.62	5,546,689	14,233,620	.....	.....	2,223,225	9,024,509
1942	2,801,846	1.26	3,752,756	14,139,303	.....	.....	2,223,579	7,109,812
1941	(B) 5,026,202	2.25	2,928,159	12,897,743	3,140,000	.....	2,231,879	5,657,951
1940	2,193,471	.97	4,031,723	13,106,604	7,562,757	.....	2,251,017	1,926,084
1939	1,720,292	.76	4,534,676	11,671,041	7,575,979	.....	2,258,779	4,999,629
Continental Oil Corp.								
1943	14,080,702	5.00	32,727,193	82,290,941	2,806,743	.....	4,682,561	100,004,761
1942	14,924,698	3.19	27,954,923	82,045,727	5,859,055	.....	4,682,563	91,806,436
1941	15,398,082	3.29	17,646,983	82,010,052	8,714,875	.....	4,682,565	81,564,115
1940	4,317,658	.92	30,010,809	73,082,217	21,906,177	.....	4,682,568	70,848,410
1939	6,304,504	1.35	38,844,133	63,132,258	21,071,600	.....	4,682,572	71,213,345
Creole Petroleum Corp.								
1943	(C) 11,636,700	.44	20,788,692	154,684,278	.....	.....	26,606,610	45,479,756
1942	3,469,000	.50	4,360,149	75,539,403	.....	.....	6,974,356	45,720,611
1941	12,297,275	1.76	8,193,304	73,259,828	.....	.....	6,974,356	47,679,036
1940	6,834,170	.98	4,113,744	71,507,758	.....	.....	6,974,356	42,356,117
1939	9,590,366	1.37	7,436,866	68,869,647	.....	.....	6,974,356	42,496,303
Gulf Oil Corp.								
1943	29,301,053	3.23	101,190,142	382,301,066	52,992,991	.....	9,076,202	153,516,655
1942	22,981,562	2.53	79,139,104	378,603,898	42,912,760	.....	9,076,202	137,829,905
1941	33,568,624	3.70	80,951,044	372,056,770	46,155,801	.....	9,076,202	128,462,646
1940	22,150,277	2.44	125,388,013	257,743,026	48,590,062	.....	9,076,202	107,609,862
1939	15,315,781	1.69	97,534,014	351,936,147	51,112,595	.....	9,076,202	111,929,542
Humble Oil & Refining Co.								
1943	45,711,511	2.54	70,658,062	341,516,999	53,533,744	.....	(E) 17,975,680	188,234,701
1942	29,243,303	1.25	56,022,566	336,571,341	52,570,414	.....	8,987,840	164,992,790
1941	35,356,558	3.93	45,823,214	325,080,832	42,014,167	.....	8,987,940	154,036,877
1940	28,107,503	3.13	41,137,524	313,065,476	42,417,737	.....	8,987,940	138,406,211
1939	29,950,288	3.33	40,298,938	304,322,126	42,721,438	.....	8,987,840	132,409,925
Imperial Oil, Ltd.								
1943	15,548,873	.57	69,604,722	40,455,813	.....	.....	26,965,078	56,345,318
1942	14,663,097	.54	60,583,509	44,826,797	.....	.....	26,965,078	54,021,208
1941	16,144,069	.60	56,767,380	43,103,735	.....	.....	26,965,078	53,383,418
1940	17,635,717	.65	45,061,925	41,243,450	.....	.....	26,965,078	50,721,888
1939	19,250,071	.72	43,959,297	41,125,802	.....	.....	26,965,078	49,936,345
Mid-Continent Petroleum Corp.								
1943	6,566,618	3.53	32,729,621	36,450,773	.....	.....	1,857,912	50,583,350
1942	6,112,158	3.29	30,603,308	35,443,077	.....	.....	1,857,912	47,465,394
1941	4,866,036	2.62	25,110,651	36,035,163	.....	.....	1,857,912	44,893,313
1940	2,967,394	1.60	21,549,569	37,074,524	.....	.....	1,857,912	42,627,669
1939	2,650,502	1.42	20,139,581	37,668,405	.....	.....	1,857,912	41,994,545
Ohio Oil Co.								
1943	14,146,802	2.14	26,347,464	76,236,983	12,500,000	.....	6,563,377	35,899,013
1942	12,508,953	1.74	22,779,178	80,310,995	12,500,000	57,046	6,563,377	31,015,260
1941	10,799,736	1.42	24,895,921	89,838,837	15,500,000	212,233	6,563,377	24,405,355
1940	8,733,164	1.02	31,772,031	86,050,956	14,000,000	339,337	6,563,377	19,772,774
1939	1,492,086	(A) 4.29	30,468,732	90,583,528	18,000,000	354,537	6,563,377	15,596,459
Phillips Petroleum Co.								
1943	14,168,422	3.04	24,494,808	205,917,876	28,707,826	.....	4,916,987	57,535,250
1942	13,129,457	2.95	33,630,615	188,723,195	38,608,431	.....	4,492,980	52,739,178
1941	17,346,977	3.92	30,001,026	180,708,712	33,923,259	.....	4,449,052	48,507,824
1940	11,590,317	2.61	29,130,002	173,186,916	32,589,696	.....	4,449,052	41,081,214
1939	9,833,314	2.21	24,305,805	174,933,218	33,598,518	.....	4,449,052	38,389,001
Pure Oil Co.								
1943	13,874,517	2.50	32,089,974	151,721,887	2,829,457	725,431	3,982,431	78,833,591
1942	13,761,826	2.47	30,915,653	126,026,907	3,174,175	725,431	3,982,031	71,853,446
1941	15,285,255	2.86	24,719,281	123,223,061	2,952,147	725,431	3,982,031	63,990,259
1940	8,718,057	1.21	22,700,307	115,237,430	3,478,686	725,431	3,982,031	54,604,294
1939	8,290,418	1.11	23,186,755	112,484,522	2,361,852	721,956	3,982,031	50,781,463
Seaboard Oil Co.								
1943	$1,949,096	$1.58	$4,512,666	$7,410,791	$3,040,000	.....	$1,234,237	$4,097,062
1942	1,463,706	1.18	3,314,271	7,620,841	3,440,000	.....	1,234,252	3,816,255
1941	1,257,367	1.02	2,118,383	4,546,182	.....	.....	1,229,083	3,146,415
1940	1,300,993	1.05	2,698,551	3,980,081	.....	.....	1,244,383	3,439,929
1939	1,746,464	1.40	2,306,744	3,988,415	.....	.....	1,244,383	3,496,862

UNITED STATES OIL COMPANIES

	Net Income	Per Share of Com.	Net Working Capital	Net Capital Assets	Funded and or Long Term Debt	No. of Pref. Shares	No. of Com. Shares	Surplus
Shell Union Oil Corp.								
1943	24,542,556	1.82	90,151,050	222,510,924	94,135,000	.....	13,470,625	42,446,874
1942	16,860,007	1.28	95,774,423	199,551,494	104,278,000	.....	13,070,625	34,086,647
1943	17,334,214	1.32	84,067,926	228,964,879	108,961,000	.....	13,070,625	36,648,283
1940	15,654,678	1.05	95,975,926	227,769,292	85,000,000	331,225	13,070,625	34,797,441
1939	11,805,713	.76	87,762,089	261,105,471	85,000,000	341,100	13,070,625	16,872,684
Sinclair Oil Corp.								
1943	23,083,709	1.85	89,494,580	239,682,758	66,801,857	.....	12,928,205	209,148,169
1942	18,060,598	1.42	101,393,765	216,238,439	92,395,928	.....	13,651,405	193,038,459
1941	16,472,494	1.25	83,592,829	216,209,874	79,588,000	.....	13,128,953	181,692,426
1940	3,792,602	.28	91,144,403	194,838,625	69,030,627	.....	13,531,915	172,115,495
1939	7,540,880	.55	98,179,411	196,742,476	70,481,429	.....	13,751,726	183,590,985
Skelly Oil Co.								
1943	5,461,708	5.56	11,772,045	53,808,491	11,200,000	.....	981,349	39,154,199
1942	5,632,805	5.73	11,863,363	52,375,519	13,600,000	.....	981,348	35,164,513
1941	5,913,826	6.02	8,445,051	51,063,964	14,800,000	.....	981,348	30,758,394
1940	3,316,678	3.28	7,694,042	48,279,943	16,000,000	.....	981,348	26,316,591
1939	2,360,783	1.99	7,788,739	45,009,713	9,000,000	63,000	995,348	25,581,908
Socony-Vacuum Oil Co., Inc.								
1943	35,944,983	1.15	271,335,854	499,503,866	126,716,312	.....	31,708,452	191,024,911
1942	30,808,397	.99	234,062,698	481,070,509	123,674,996	.....	31,708,452	170,669,089
1941	43,175,902	1.38	216,888,148	471,740,585	126,383,580	.....	31,708,452	155,449,853
1940	36,409,055	1.17	197,297,070	455,058,914	133,727,410	.....	31,708,452	178,320,612
1939	34,452,710	1.10	189,357,083	493,139,415	126,419,256	.....	31,708,452	232,514,577
Standard Oil Co. of California								
1943	36,116,060	2.78	111,393,415	466,335,156	40,000,000	.....	13,003,953	245,657,323
1942	30,558,547	2.35	93,310,560	470,851,310	40,000,000	.....	13,003,935	239,748,878
1941	29,909,421	2.30	103,755,136	455,881,836	40,000,000	.....	13,003,953	231,537,260
1940	22,487,586	1.73	88,553,262	445,593,600	25,000,000	.....	13,102,900	230,320,612
1939	17,882,505	1.36	88,095,224	446,839,002	25,000,000	.....	13,102,900	235,332,469
Standard Oil Co. of Indiana								
1943	50,591,371	3.31	186,639,059	498,147,998	17,537,965	.....	15,284,876	377,731,563
1942	44,183,893	2.89	203,989,055	443,433,258	16,453,283	.....	15,284,892	348,050,454
1941	48,385,967	3.17	185,923,067	431,134,060	14,698,741	.....	15,284,935	319,452,179
1940	33,597,342	2.20	191,548,946	396,068,183	19,488,465	.....	15,271,982	294,114,662
1939	34,142,643	2.23	186,837,449	378,973,235	8,713,074	.....	15,272,014	277,716,485
Standard Oil Co. (N. J.)								
1943	121,327,773	4.45	585,859,209	1,092,251,188	232,157,560	.....	27,283,587	672,584,273
1942	83,361,920	3.06	495,667,607	1,104,036,333	248,072,906	.....	27,283,587	642,011,449
1941	140,572,419	5.15	506,275,556	1,040,832,931	194,512,825	.....	27,283,587	636,189,422
1940	123,886,346	4.54	485,854,976	1,078,223,509	187,553,785	.....	27,278,666	618,087,745
1939	89,128,756	3.26	466,607,198	1,121,061,376	190,638,179	.....	27,285,919	593,326,890
Standard Oil Co. of Ohio								
1943	4,905,634	5.68	20,098,777	67,853,801	22,179,387	120,000	758,519	37,729,768
1942	5,649,880	6.68	26,286,564	57,335,786	23,151,743	120,000	756,265	34,437,272
1941	6,249,443	7.47	17,566,209	51,799,637	9,446,676	120,000	752,265	31,088,988
1940	6,209,008	7.44	13,259,188	47,677,770	5,314,681	120,000	753,740	27,285,388
1939	5,602,499	6.64	15,403,625	43,965,974	6,702,971	120,000	753,740	23,180,268
Sun Oil Co.								
1943	13,353,524	4.56	59,380,803	104,366,531	35,894,794	93,197	2,838,929	27,062,509
1942	8,671,050	2.91	50,339,826	99,510,033	29,025,154	93,197	2,838,929	18,263,495
1941	16,532,540	6.21	36,011,101	93,470,154	21,007,495	93,107	2,850,826	13,604,990
1940	7,969,068	3.03	22,552,302	93,278,795	18,066,869	100,000	2,434,840	15,958,344
1939	6,959,677	2.74	29,845,003	84,353,938	21,275,033	100,000	2,318,918	15,091,224
The Texas Co.								
1943	42,889,797	3.83	176,654,852	415,353,085	123,998,331	.....	11,186,279	265,299,539
1942	35,060,001	3.32	174,619,189	368,886,617	106,000,000	.....	10,875,627	237,718,261
1941	51,874,681	4.77	148,797,057	366,505,822	111,801,380	.....	10,875,800	222,837,338
1940	31,547,662	2.90	124,231,625	365,656,993	111,834,697	.....	10,875,994	197,634,702
1939	32,886,807	3.02	136,423,045	354,847,254	102,521,409	.....	10,876,139	200,036,059
Tide Water Associated Oil Co.								
1943	14,902,640	1.98	58,391,066	133,722,641	30,436,400	500,000	6,389,394	50,267,921
1942	10,663,930	1.32	49,561,629	134,115,502	33,436,400	500,000	6,375,364	42,890,964
1941	15,564,093	2.09	42,482,262	137,982,146	36,936,400	500,000	6,374,033	37,342,776
1940	9,519,083	1.14	39,973,976	132,143,846	38,200,000	500,000	6,372,676	33,148,237
1939	8,958,971	1.05	40,018,720	126,832,660	36,848,615	500,000	6,368,667	33,094,647
Union Oil Co. of California								
1943	7,269,199	1.56	41,071,274	144,962,486	42,544,600	.....	4,666,270	27,525,466
1942	5,537,329	1.19	48,758,124	133,893,458	43,639,000	.....	4,666,270	24,249,828
1941	6,239,232	1.34	36,622,981	130,271,906	37,480,000	.....	4,666,270	23,840,595
1940	4,606,790	.99	44,936,309	120,260,932	37,958,500	.....	4,666,270	22,283,270
1939	5,846,241	1.25	48,600,887	116,536,861	38,018,500	.....	4,666,270	22,350,171

(A) On preferred stock.
(B) Including a non recurring profit of $2,515,996 from the sale of West Texas lands.
(C) Reflects acquisition of certain assets of Logo Petroleum Corp. in August, 1943.
(E) Stock split two-for-one late in 1943, and per share net is on larger share basis.

LAKE CHARLES REFINERY AN ALL-OUT WAR PLANT

New Plant of Cities Service Refining Corporation, Designed to Extract from Crude Last Possible Drop of Aviation Fuel and Butadiene—Conversion Rate Highest Yet Attained

T. W. Tutwiler, President Cities Service Refining Corp.

Statement by W. Alton Jones

W. Alton Jones

THE Tutwiler Refinery and Butadiene Plant at Lake Charles, Louisiana, daily turning out large quantities of materials vital to our offensive warfare against Hitler and Hirohito, stand as a monument to the American way of life.

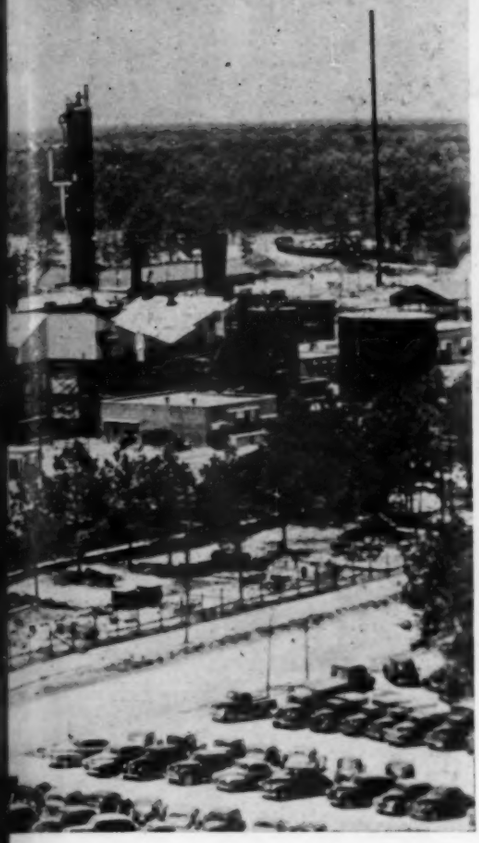
Constructed from the ground up in an almost incredibly short space of time, in the face of many difficulties, they are typical of American determination and American skill. For to most of us, the American way of life means management, labor, capital and government—working together in harmony to provide a better life for all.

We look forward at Lake Charles to new and higher standards of efficiency in the use of America's strategic oil reserves. The plants are dedicated to Victory . . . to our boys on the battle fronts . . . in the hope that their output may bring them home sooner and bring more of them home.

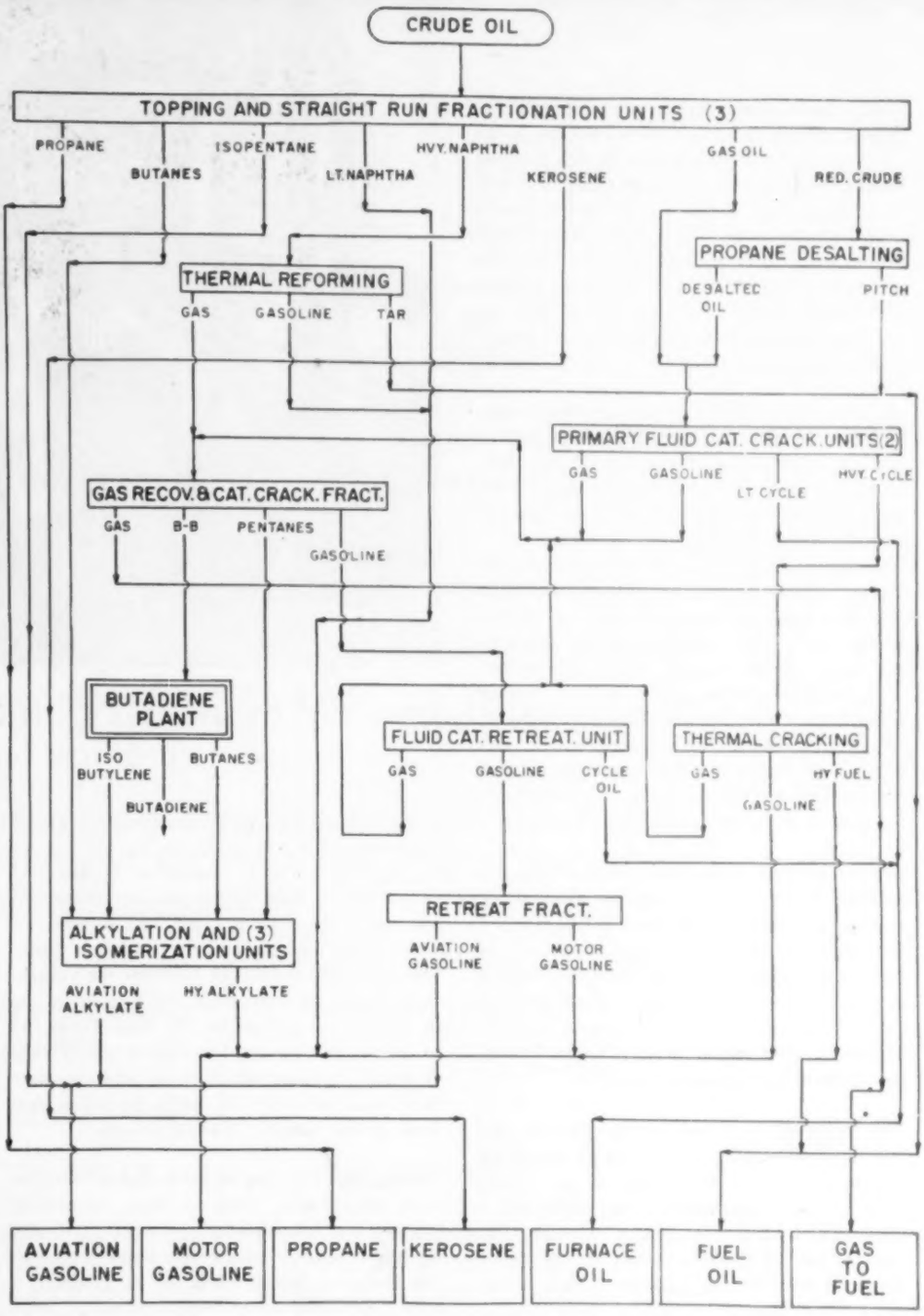
THE Lake Charles (La.) refinery of the Cities Service Refining Corporation (subsidiary of the Cities Service Company) which came into operation in December, 1943 and was formally dedicated last May, is in a large sense unique among the great number of giant petroleum refineries that have been built in the United States to serve the needs of war.

This uniqueness lies principally in the fact that the Lake Charles refinery was designed and constructed with an eye single to the production of aviation gasoline and raw material (butadiene) for the manufacture of synthetic rubber. Other refined petroleum products like ordinary gasoline and fuel oil are also unavoidably produced, but these are wholly secondary to the two main products and regarded as necessary evils; their amounts are kept to the lowest possible minimum. The crude oil that flows into the refinery is made to yield, within reason, the last possible drop of 100-octane gasoline and the last possible drop of butadiene. For this reason the Lake Charles refinery has no lubricating oil department, produces no wax or petroleum solvents or other specialties; the values that go into these specialties are wanted for aviation fuel and for the rubber that is vital for military and civilian purposes.

Part of the distinction of this refinery comes from the fact that it was "started from scratch". Unlike most other new aviation gasoline plants, this one was not built in connection with an existing peace-time refinery. In these other plants the designers and engineers have perforce been under necessity of tying in the new aviation gasoline departments with the existing pre-war installations, and the need for making adjustments with current operations has restricted their choice among available processes and designs.



This Great Plant Will Supply Butadiene for Conversion into 55,000 Tons of Synthetic Rubber.



The designers of the Lake Charles refinery were freed from these inhibitions. They were given a free hand and, literally, a free field. They were presented with a large tract of land covered by a pine forest and told to erect thereon the best and most efficient possible plant for the production of 100-octane gasoline, and butadiene for synthetic rubber, with as little as possible of other commodities. This assignment was accepted by the designers as the realization of an "engineer's dream"—unrestricted freedom in the choice of process, apparatus, and layout, so that every step could be perfectly integrated with every other step; no enforced adaptation of old or second hand equipment "made to do" for economy's sake; everything new, and the best of its kind that could be wrangled through the system of priorities; everything fitting neatly into a comprehensive master plan. In a word, this refinery was conceived and built as a unit, and all its components were finished and ready for use at the same time.

The site is at Rose Bluff on the Calcasieu River and Ship Channel, a few miles below the city of Lake Charles. Pipe line facilities are available for bringing in crude oil from Mid-Continent, East Texas and Southern Louisiana fields. Finished gasoline is loaded directly on sea-going freighters and tankers that berth at wharves alongside the refinery. Butadiene produced at the refinery is piped to an adjacent copolymerizing plant for conversion into synthetic rubber.

The main refinery was privately financed by Cities Service Company at a cost which is said to be about $75,000,000. The design of the plant was worked out by the company's technologists in collaboration with engineers of the M. W. Kellogg Company; actual construction was done under contract by the Kellogg Company, which already had much experience in the design and construction of oil refineries employing the fluid catalyst cracking process, and to whom the Lake Charles project was "Job 888". Kellogg also built the butadiene unit. This unit was financed and is owned by the Defense Plants Corporation, and is operated for government account by Cities Service Refining Corporation. DPC also financed and owns the adjacent synthetic rubber plant which is operated for the government by the Firestone Rubber.

Some idea of the magnitude of this plant and the scale of its operations may be conveyed by mentioning a few superlatives. The installations occupy an area of 600 acres. More than 20,000,000 man-hours of actual construction time went into the building. Materials for the refinery and butadiene plant cost about $36,000,000 and to procure these materials some 30,000 purchase orders were made out. Nearly a million blueprints showing detailed design were made. Concrete poured amounted to 3,159,000 cu. ft. There was 250 miles of continuous welding; 1100 miles of pipes and tubing; some pipe up to 7 ft. in diameter was put in. The power plant generates enough electricity for a city of a quarter million inhabitants. The water pumping system has a capacity for 227,000 gallons a minute, which exceeds the rate at

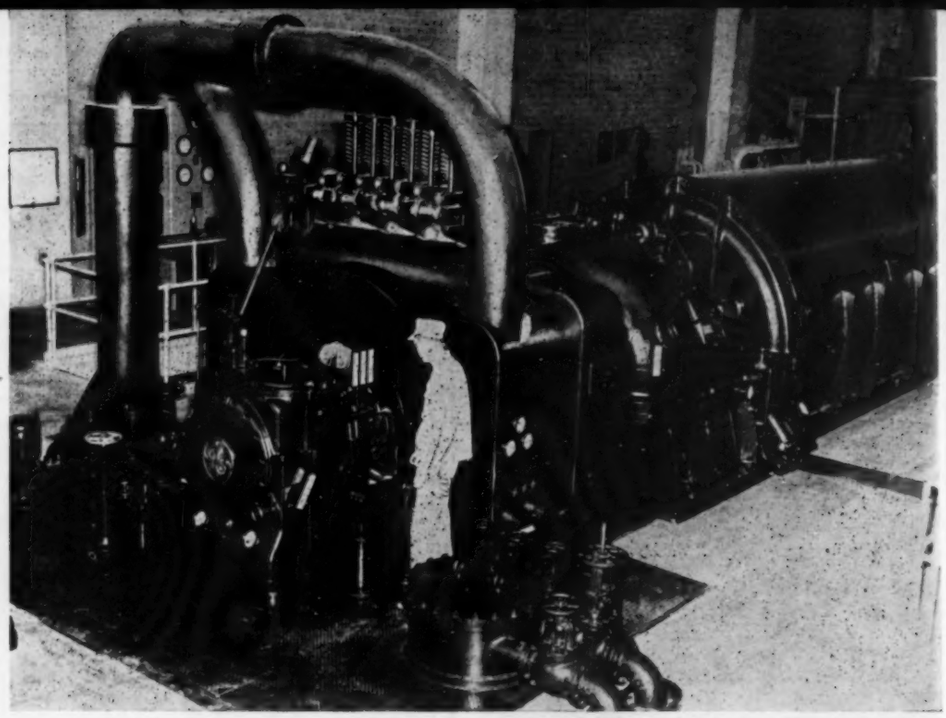
which water is supplied to the entire city of Philadelphia. Nearly the whole normal volume of the Calcasieu River is passed through this pumping system. Enough 100 + -octane gasoline is produced in 24 hours to take a 1000-bomber mission over Germany along with enough ordinary gasoline to carry three armored divisions 100 miles in one day. Enough butadine is made to produce 55,000 long tons of synthetic rubber a year; this is approximately one-tenth of the nation's normal rubber requirements.

Not the least significant among these superlatives is the fact that the oil refining processes adopted for the Lake Charles refinery have been found to result in a higher percentage of conversion of the crude oil into 100-octane gasoline and butadiene than has ever been attained in any other refinery in the United States or elsewhere. Where the refining industry as a whole gets an average conversion of about 10 percent of the crude into finished 100-octane gasoline, the Lake Charles refinery attains 25 percent. This high conversion is credited to refining methods first put into use at this refinery. If the butenes diverted to synthetic rubber production are figured to the equivalent of 100-octane gasoline, the conversion of the crude to the desired products amounts to 40 percent.

The master plan of the Lake Charles refinery is reflected in the accompanying flow sheet of the refining unit and its associated butadiene unit. As stated, the designers, having a free hand in the choice of process and equipment, have striven to attain a more or less perfect balance between the various elements of the plant, with the main purpose of attaining the highest yields of aviation gasoline and butadiene for rubber.

The incoming crude oil is first directed into two identical topping units, each of which has a rated capacity of 40,000 bbls. a day. These make a rough separation of the crude into a gasoline and lighter fraction, a kerosene fraction, a gas oil fraction which is the major source of feed for the catalytic cracking units, and a heavy residuum or reduced crude which is subjected to a unique process utilizing propane for the removal of salt and asphalt, thus preparing more heavy gas oil for the catalytic crackers. So far as circumstances permit one of the topping units is kept at work on East Texas crude oil and the other on crude from Southern Louisiana fields.

The desalting and deasphalting plant, in which the heavy residuum from the topping units is treated, operates by a process which is one of the principal distinctions of this refinery. Up to the present time the method used throughout the industry for handling this residuum has been limited to vacuum distillation in order to wring the last possible fraction of gas oil from the tarry residue. At Lake Charles, apparently for the first time in refining history, the bottoms from the topping units are cooled by heat exchange and the asphalt, salts, etc. are precipitated by liquid propane which



Giant Turbine and Generator in Refinery Power Plant.

serves as a selective solvent for the heavy gas oil component of the residue. In this way the amount of residuum going to asphalt or bunker fuel is reduced at Lake Charles to five percent in the case of East Texas crude, and to two percent in the case of southern Louisiana crude. On these same crudes the best that the vacuum process can do is to limit the amount of tar or pitch to 10 percent for the East Texas and to six per cent for the Louisiana crude. This is obviously an important economy, and the more so because this recovered heavy gas oil is ideal feed for the catalytic cracking process.

Meanwhile, the gasoline and lighter fraction from the topping units is being treated in straight run fractionating towers which remove the more volatile products from propane through the pentanes. Among these lighter products is about 1000 bbl/day of isopentane which helps to give volatility to the aviation gasoline. The light naphtha is segregated as a base for about 8,400 bbl/day of aviation gasoline of a grade below 100 octane. The heavy naphtha fraction is diverted to a thermal cracking or reforming unit designed for producing butylene for the butadiene plant. The kerosene fraction is segregated as such. The gas oil distillate is combined with the heavy gas oil obtained from the deasaphaltizing plant and the mixture is charged to the two primary catalytic cracking units.

The catalytic cracking units are designed to work by the fluid catalytic cracking process and embody all the latest improvements. There are three of these units, two for working on the primary feed delivered by the topping units and the third for catalytically retreating the liquid products of the first two. By-products of the catalytic units are gas and gasoline, light crude oil, and heavy cycle oil; the latter is thermally cracked to produce gas, motor gasoline and heavy fuel oil; the light cycle oil is disposed of as furnace oil.

All the gas and gasoline fractions from the catalytic and thermal cracking and reforming units are passed through a unit for gasoline recovery and fractionation. The butane-butene fraction is recovered for the butadiene unit, and the light pentane-amylene fraction is sent to a "B" alkylation unit which produces therefrom about 6,600 bbl./day of pentene alkylate.

An alkylation unit "A" produces alkylate (sulphuric acid process) from isobutylenes discarded from the butadiene plant and propylenes from refinery waste gases. Both alkylation units are supplied with natural isobutane from the topping units and isobutane produced from normal butane in an isomerization unit. The gasoline from the gas recovery system is sent through the third catalytic (retreating) unit. The liquid portion from the retreating unit is separated into a fraction constituting a base stock which, after blending with aviation alkylate and iso-pentane becomes 100-octane gasoline, and another fraction which is fit only for motor gasoline.

The butanes-butenes fraction from the gas recovery systems not only supplies isobutylene and butane for alkylation and isomerization, but also normal butenes for the butadiene plant. The isobutylene, the isobutane and the normal butane contained in the "B-B" mixture are separated from the normal butylenes by acid and solvent extraction and returned to the alkylation units from conversion into aviation gasoline. The buta-

(*Continued on page 54*)

Keeping them in business

Many a refiner who is an important partner in Uncle Sam's 100-octane gasoline program might not even be in business today except for

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★ ★ ECHOES FROM THE WASHINGTON OIL FRONT ★ ★

By **W. J. Maddox,** Chief of World Petroleum's Washington Bureau

PAW Staff Changes

Donald R. Knowlton

PAW is undergoing another of those back-to-industry movements that periodically infect its staff of trained key men. In the exodus this time is one of its really top-flight executives, Donald R. Knowlton, who for more than two years has been Director of Production, a vital job that he has performed with outstanding ability. Knowlton resigned to become manager of the foreign division of the Phillips Petrleum Company, with headquarters in Bartlesville, Okla.

In announcing the resignation, Deputy Petroleum Administrator Ralph Davies said: "I regret very much having to accept Mr. Knowlton s resignation. His work during the 28 months he has served as Director of Production has been extremely valuable to the Petroleum Administration for War. While he has remained with PAW for more than the agreed period, his services here will be greatly missed."

A native of Iowa, Knowlton received his bachelor of arts degree from the University of Colorado in 1920 and his petroleum engineering degree from Stanford University in 1924. Joining the staff of the Phillips Petroleum Company in 1926, he rose to be manager of the production department, the position he held at the time he entered government service.

The exodus of PAW's first-string men is not causing concern to the heads of the organization and has even led to the suggestion of "freezing" incumbents in their jobs. Others fear that before long PAW may be staffed with men who would like to make a career of regulating the oil industry from desks in Washington. An organization of such bureaucrats, once they dig in and build up an argument for their existence, would be hard to unseat.

McCoy Succeeds Jergins

AS Director of PAW's Facility Security Division, William K. McCoy, newly appointed successor to Allen A. Jergins, has responsibility for protecting thousands of miles of pipe line and hundreds of refineries, synthetic rubber plants and other vital war facilities from sabotage and espionage, fires and other damage. The job requires close cooperation with Army, Coast Guard and industry committees. Formerly special assistant to the director of PAW's Construction Division, McCoy has been with PAW since September 1942. Before joining the staff he was with the Gulf Oil's engineering and construction division in Pittsburgh, Pa. A native of that city, he is a graduate of the University of Pittsburgh and is 39 years old.

Mr. Jergins, who resigned June 1, will return to Long Beach, Calif., to resume his duties as vice-president and director of the Jergins Oil Company. He has been on leave from the company since August 1942 when he joinded the staff of the Petroleum Administration for War.

Praise for Max Miller

Max B. Miller

MAX B. MILLER, director of the Petroleum Administration for War's Construction Division, turned the job over to Assistant Director George Gibson June 1 and returned to New York City to resume his duties as president of the Max B. Miller Company, petroleum industry refinery consultants. He left the company in April 1942 as assistant director of refining for the Petroleum Administration and became director of construction in July 1943.

For more than two years Miller has carried the principal load of the 100-octane refinery construction program, which Deputy Administrator Davies says is "probably the most critical of all the war programs for which PAW has been responsible." In announcing the construction chief's resignation, Davies said: "The use of 100-octane aviation gasoline by the Allied Air Forces has played a major role in achieving superiority over the enemy in the skies, and Mr. Miller may be specially proud of the significant work he has done in assuring and hastening the day of victory."

Gibson Takes Over

GEORGE GIBSON, who now becomes Director of the Construction Division, joined the staff of the Petroleum Administration for War in September 1941 as a refinery materials expert. He was appointed assistant director of the Construction Division in November 1943, shortly after it was enlarged to push construction of 100-octane plants. From 1929 to 1940, Gibson was chief process engineer for the C. H. Leach Company in New York City. In the latter year he became a refinery technologist and consultant of the Hancock Oil Company in Long Beach, California, where he remained until drafted by the Petroleum Administration. A native of Pittsburgh, Pa., he is 41 years old. He attended Rutgers University and the University of Michigan. His home is in Montclair, N. J.

Materials Shortage Persists

PROSPECT of an easing of certain critical materials during the third quarter of 1944 has been dampened by PAW's warning that many items are tight and will remain so for some time. Contrary to the opinions of some operators, the critical stage of materials shortage has not passed. There will be a shortage of steel plate available for tankage and pressure vessels, lumber for dunnage and scaffolding, drill pipe, tool joints, internal combustion engines and component parts, heavy trucks, tractors, bearings, wire rope, and manila cable. Shortage, too, will occur in finished shapes and components.

Use of critical items in the manufacture of certain military equipment is given as the cause. Until military requirements are filled, certain items will remain on the critical list and, as a result, will affect the supply of materials required in the petroleum industry.

Arab Pipe Dream Fading

Leo Crowley

ANY thought that Petroleum Reserves Corporation may go ahead with the Saudi-Arabian pipe line deal before Senator Maloney's special committee finishes its hearings was certainly dispelled by Petroleum Reserves Corporation Chairman Leo Crowley, when he appeared recently before a House appropriation subcommittee. And if anyone has any doubt that Mr. Crowley is "czar" of the corporation, listen to what he told the Congressmen. Representative Taber was curious about the pipe line and asked: "There will be no final contracts concluded until after the Senate investigation?"

The PRC chairman replied: "So far as I am concerned, I certainly would not do it, and I am the one who controls the funds, until after the Senate has completed its hearings. I think we should wait and see what their wishes are in the matter." Earlier he had told the group

that there had been negotiations for the pipe line and he thought it was the general attitude of the board of directors to wait until after the Maloney committee has had an opportunity to hold a full hearing on the proposal. A "full hearing" appears to be somewhere in the indefinite future—maybe after election.

Several weeks after Crowley's disclosure to the congressmen, the President told a press conference that the pipe line project was in the "iffy" stage. He didn't know if there would be a pipe line built in the Middle East by PRC or simply the development of oil resources there. There had been a change, he indicated, but conversations with the British were still going on concerning Anglo-American oil problems.

QMG Acquires Museum

FUELS and Lubricants Division of the Office of The Quartermaster General was one year old June 1. Brig. Gen. H. D. Peckham, director, observed the anniversary by accepting a "museum" that traces the progress of petroleum from the depths of the earth to its many uses in the war. The exhibit, said to be the only one of its kind, was presented to the Army as a loan for the duration by a special committee appointed by the chairman of the lubrication and containers committee of the Petroleum Industry War Council.

Members of the committee under whose direction the "museum" was set up in a specially prepared room at the Office of the Quartermaster General were W. H. Correa of Socony-Vacuum, chairman, D. P. Clark and L. P. Lochridge. Actual construction and arrangement of the exhibit were handled by oil industry exhibit men.

The "museum" includes models of an oil well and a fractionating tower, such as is used in a modern refinery; an actual cross-section of the 24-inch pipe used in the "Big Inch"; cut-away models of engines and other parts of Army vehicles, showing how they work and how they utilize petroleum products; and four continuous motion pictures showing the production, refining, transportation and distribution of petroleum products, as well as many of the uses to which the Army puts these products, and the tests to which Army vehicles and other equipment puts the products to determine their desired characteristics before they are made Army Standard. The exhibit will be used for educational and training purposes.

"One of our most successful undertakings during the year," General Peckham said in discussing the division's work, "was the two-day orientation courses which we held in March and April for two groups of officers from other services just prior to their departure for petroleum assignments overseas. The preparations were carefully made, the quality to instruction was high, and all of our speakers gave evidence of enthusiasm and knowledge of their subjects which made a deep impression on the classes. We plan to continue this policy from outside the Division for overseas assignments relating to oil and coal."

Aviation Super Fuel on Way

IN explaining increased estimates for high-octane aviation gasoline for 1945 recently before a House appropriations sub-committee, Capt. H. M. Schaffer of the Navy Bureau of Supplies and Accounts dropped a few remarks concerning a "super" fuel that is in the making. It will cost even more than the $7.70 a barrel shipside price figured for the coming year for "grade 130" aviation gasoline. Reference to the new fuel was in a carefully prepared statement.

"It is known that there is in production a more powerful fuel which exceeds grade 130 in performance results," the statement said. "While operating experience and the cost of producing this super fuel is extremely limited, it is known that the process involves the elimination of large quantities of the least expensive elements now used in refining grade 130, an increase in the quantities of the more expensive components, and the rearrangement of other existing refinery operations. The best available estimates indicate that the refinery cost of this new fuel will range from 6 to 10 cents per gallon more than grade 130. Upon the basis of the current Defense Supplies Corporation price, this will mean a per gallon cost at refinery ranging from 22 to 26 cents. To the extent that production of this new fuel is developed and increased, the cost for combatant aviation gasoline will likewise increase."

In establishing $7.70 a barrel for grade 130 for the fiscal year 1945, the Bureau took into account (1) actual experience during the fiscal year 1944, (2) actual costs today, and (3) factors existing today which so far as can be seen will continue throughout the coming 12-month period. Average shipside cost is based on the current price of $6.72 a barrel at the refinery plus estimated transportation and other costs. Average cost at the refinery during the fiscal year just closed has been $6.42 a barrel.

Houston Quits OPA

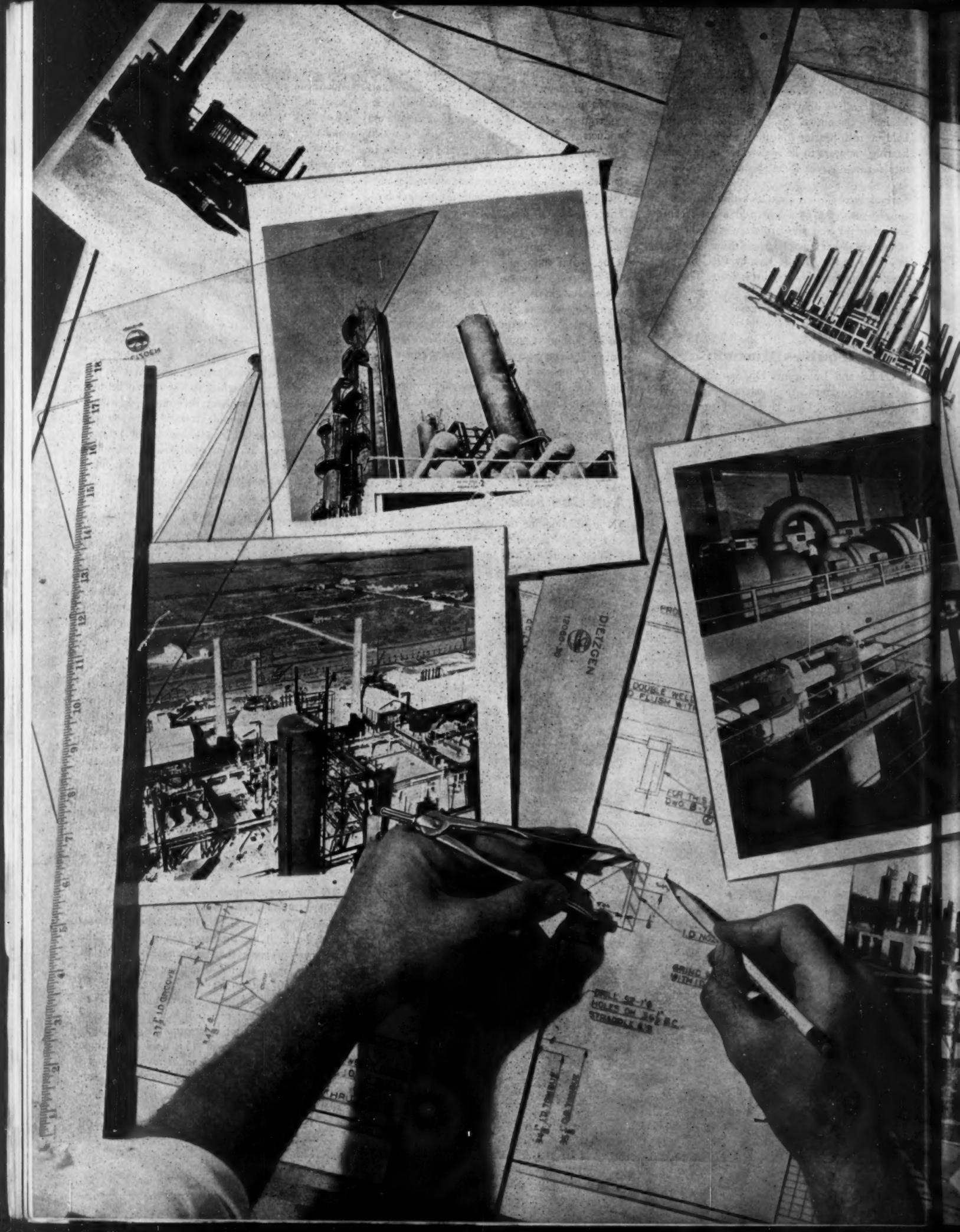
Col. Bryan Houston

OFFSETTING persistent rumors that the departures of Col. Bryan Houston from his post of deputy administrator for rationing in OPA was due to disagreement with the policies of that much-buffeted agency in regard to gas and tire rationing Administrator Bowles issued a statement saying that the Army simply could not spare Col. Houston any longer. At the same time he spoke words of praise for Charles J. Phillips who succeeds to the position and who had been criticised in Congress as lacking practical experience.

Army's Use of Oil

IN outlining the work of the Army's Fuels and Lubricants Division during its first year of operation, Brig. Gen H. L. Peckham, director, revealed that it has processed requisitions for the purchase of more than 700 million gallons of gasoline; more than 300 million gallons of diesel oil; 50 million gallons of engine oil; 50 million pounds of grease; three million gallons of gear lubricants; two million gallons of various special oils; not to mention approximately 12 million tons of coal. This does not include petroleum products used in Army Air Forces aircraft, as the Air Corps attends to these procurements itself.

W. H. Correa of Socony-Vacuum Presenting the Petroleum "Museum" to Brig. Gen. H. L. Peckham, Director of the Army's Fuels and Lubricants Division. Left to Right: Allen H. Hand, Secretary P.I.W.C.; Gen. Peckham; Mr. Correa, Deputy Petroleum Administrator; Ralph H. Davies and Maj. Gen. Edmund B. Gregory, Quartermaster General.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Oil Company Staff Changes

Edwin S. Hall

EDWIN S. HALL has been made chairman of of American Petroleum Industries Committee succeeding Col. Harry T. Klein, who recently resigned upon his election to the presidency of The Texas Company.

Mr. Hall, vice president of the Standard Oil Company of New Jersey, has been secretary of the committee since its formation in 1932. He has been associated with Standard since 1920, became senior counsel in 1933, and was made a director of the Delaware corporation in 1934. He was elected a vice president in 1940.

Cyrus S. Gentry, vice president and secretary of the Shell Oil Company becomes secretary of the committee of which he has been a member since 1941.

THE Shell Oil Company, Inc., announced that four executives have been appointed officers of the company effective June 1. E. Chester Peet, formerly assistant treasurer, becomes vice-president and treasurer. Cyrus S. Gentry, general counsel and secretary, has been made vice-president. John W. Watson, treasurer has been made assistant treasurer of the Shell Union Oil Corporation. The company announced at the same time that William H. Garbade has been appointed assistant treasurer to succeed Mr. Peet.

Mr. Peet started as a clerk in the company's St. Louis office twenty-five years ago and has been connected with the financial and accounting activities from coast-to-coast. In 1940 he came to the head office in New York as assistant treasurer from Shell's offices in California. He is vice-chairman of the American Petroleum Institute's financial and accounting committee and, as a representative of the Controllers Institute of America, he serves as vice-chairman of the advisory committee on government questionnaires to the Bureau of the Budget.

On January 1, 1933, Cyrus S. Gentry joined the legal division of the Shell company at the St. Louis office. Four years later he came to New York as secretary of the Shell Union Oil Corporation, and when Shell consolidated its head office in St. Louis with New York in 1940, he was made secretary and general counsel for the territory east of the Rocky Mountains. He is a member of the bar of the states of New York, Texas and Missouri, the American Bar Association and the Association of the Bar in New York.

John W. Watson joined the Shell organization fourteen years ago, coming to New York at that time from California, and he will now return to San Francisco and assume responsibility for all treasury functions of the Shell Chemical Division.

Having been a member of Shell's staff for eleven years, William H. Garbade has served as economist, statistician in the President's office, assistant to the vice-president in-charge-of marketing, area manager and sales manager. Since 1941 he has been general auditor and chairman of the economics committee of the company.

Hiram J. Halle

HIRAM J. HALLE, president of Universal Oil Products Company, died on May 29, at his home, Pound Ridge, New York.

Mr. Halle was born in Cleveland, Ohio, 77 years ago. He entered petroleum refining at the time the automobile was coming into mass production, and for more than 25 years was an outstanding figure in the growth and development of the refining industry.

He became president of Universal in 1915, at the request of J. Ogden Armour, its principal stockholder, after having successfully managed and sold Mr. Armour's Standard Asphalt & Rubber Company, of which he was president.

MEINHARD H. KOTZEBUE, president of Gasoline Plant Construction Company, has received the Hanlon honor award, sponsored by the Natural Gasoline Assn. of America. In making the award at the association's annual meeting in Dallas, N.G.A.A. President James W. Vaiden said: "His foresight and practical engineering judgment in the design and construction of plants made possible savings in production costs and conservation of natural resources on a scale hitherto impossible by other means."

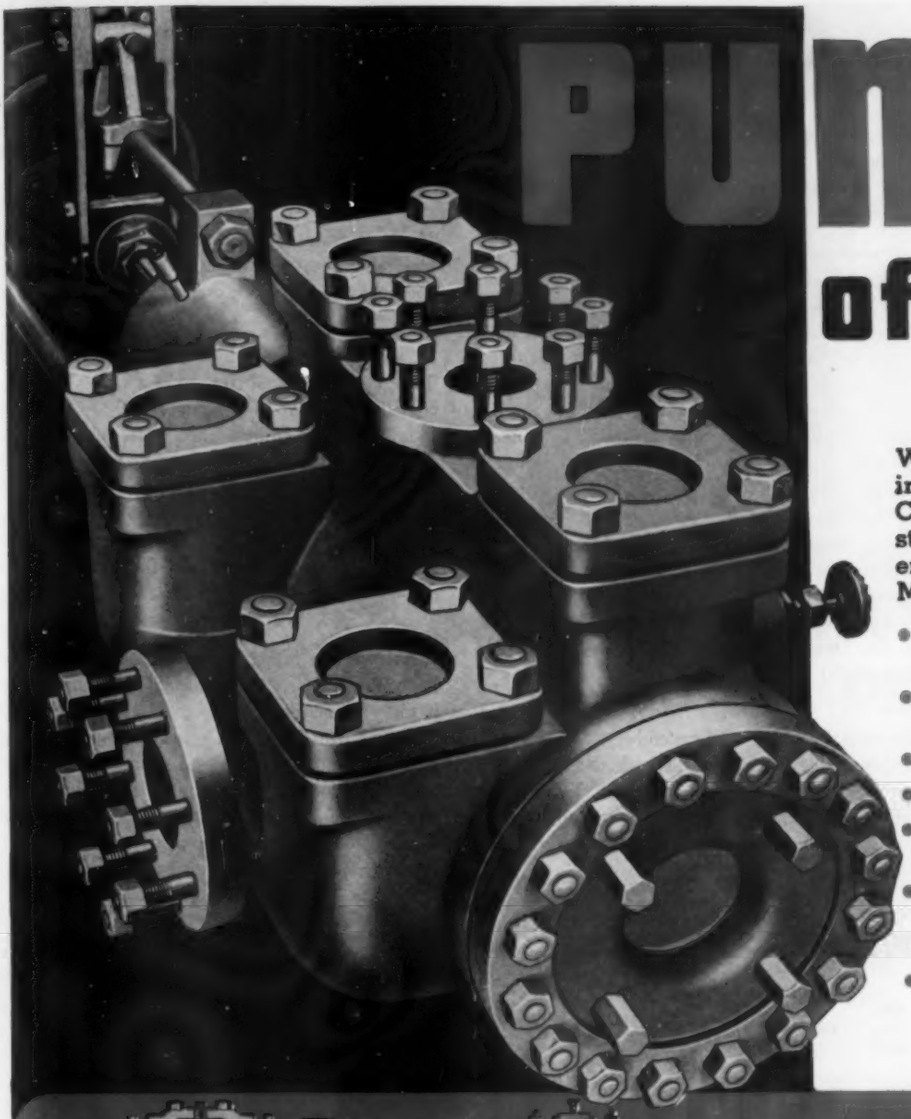
Mr. Kotzebue, a native of Texas, and an engineering graduate of Texas A. & M. was an officer flier in the first world war. After working several years in design engineering in Oklahome, he moved to Houston in 1936 and organized his own company.

E. Chester Peet

Cyrus S. Gentry

Meinhard H. Kotzebue

PUMPS of quality



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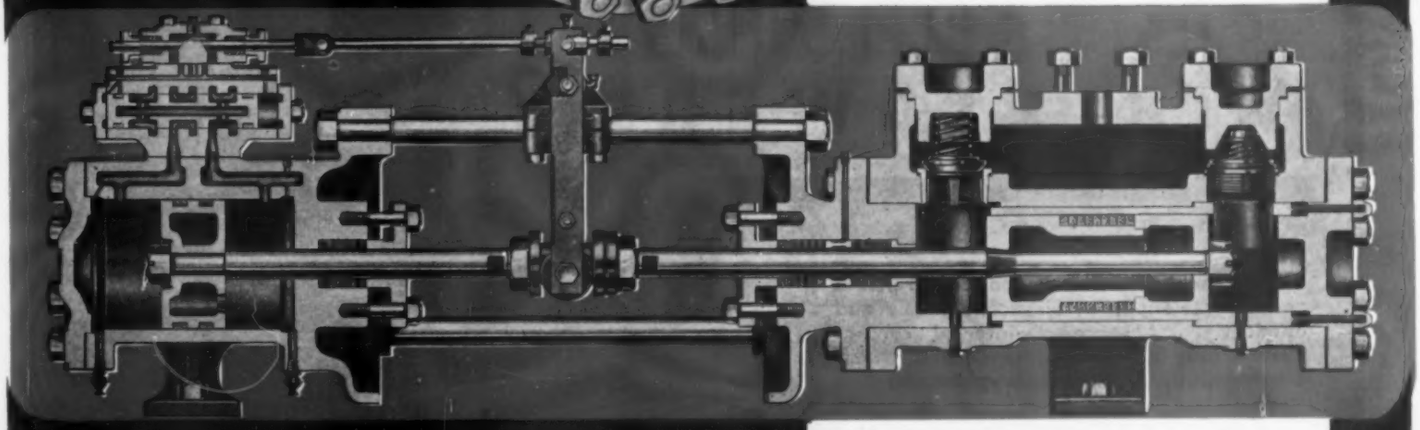

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U. S. SECTION OF PAIMEG ORGANIZED

As an outcome of the first Pan American Congress of Mining Engineering and Geology held in January 1942 under the direction of the Institute of Mining Engineering of Chile it was decided to organize a Pan American Institute of Mining Engineering and Geology (PAIMEG) with headquarters in Santiago, Chile.

National sections have been organized in Argentina, Bolivia, Brazil, Chile, Peru and Uruguay. An invitation to join in the work of the Institute was extended to the American Institute of Mining and Metallurgical Engineers which in turn appointed a committee to study the matter and make recommendations.

As a result of the report of this committee it was decided to organize a United States section of PAIMEG which is now open to charter members. Dr. Edward Stiedle, Dean of the School of Mineral Industries of Pennsylvania State College at State College, Penna., is chairman of the National Directorate. C. R. Wright, chief foreign minerals specialist of the U. S. Bureau of Mines is vice chairman. A. T. Ward, New York City Mining Engineer is secretary-treasurer and the directors are D. F. Hewett, U. S. Bureau of Mines, M. B. Gentry, vice president Freeport Sulphur Co., T. T. Read, Columbia University School of Mines, and W. B. Milligan, department of Metallurgy, Yale University.

Members of any mineral industries society in the United States and Canada are eligible to join the National Section. Individuals paying 1944 dues, amounting to five dollars, before December 31, 1944, will be recorded as charter members. The chairman was requested to make this known to interested people through the medium of the various publications in the field of the mineral industries, including societies and other technical organizations. At this stage, membership is based on willingness to aid in fostering good will and better understanding among mineral industries engineers and technologists in the Western Hemisphere. Anyone interested in joining PAIMEG as a charter member is requested to forward dues to Dr. Steidle, or to Secretary Ward whose address is 50 Church Street, New York City.

An annual meeting of the members of PAIMEG will be held in conjunction with the next February meeting of AIMME in New York and a program of papers will be presented on mining, metallurgical and geological conditions in Latin American countries.

LAKE CHARLES REFINERY

(Continued from page 46)

cuprous ammonium acetate and after final fractionation is turned over to the copolymerization plant next door.

However, the best idea of the sequence and interrelation of these various processes will be obtained by a little close attention to the admirably simplified flow sheet herewith.

The power plant of the Lake Charles refinery consists of two high-pressure—900 lbs. per square inch — boilers, two bleed-type turbo generators, and a battery of low-pressure—250 lbs. per square inch—boilers. The power plant will generate 50,000 KW, of which less than half will be used in the refinery, the balance going to the butadiene plant, the copolymerization plant, and as input to the transmission line.

As evidence of the success of the designers in laying out a perfectly balanced operational unit it may be mentioned that the Lake Charles refinery is wholly self contained, and produces from its intake of crude oil every intermediate product needed for its output of aviation gasoline and butadiene. Unlike many other plants working on this program, it does not have to import half-stuffs from outside sources.

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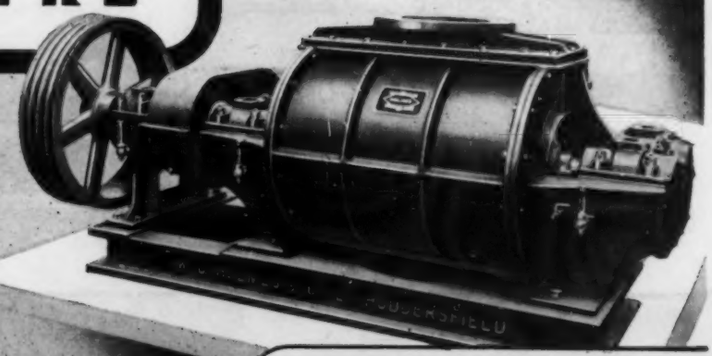

These machines deliver a positive, reliable and oil-free supply of air economically and efficiently. Absence of internal contact ensures long life, low maintenance costs and continuous operation over long periods.

This design of machine is also extensively used for Gas Exhausting or Boosting. Upwards of 1,400 machines have been supplied for such purposes.

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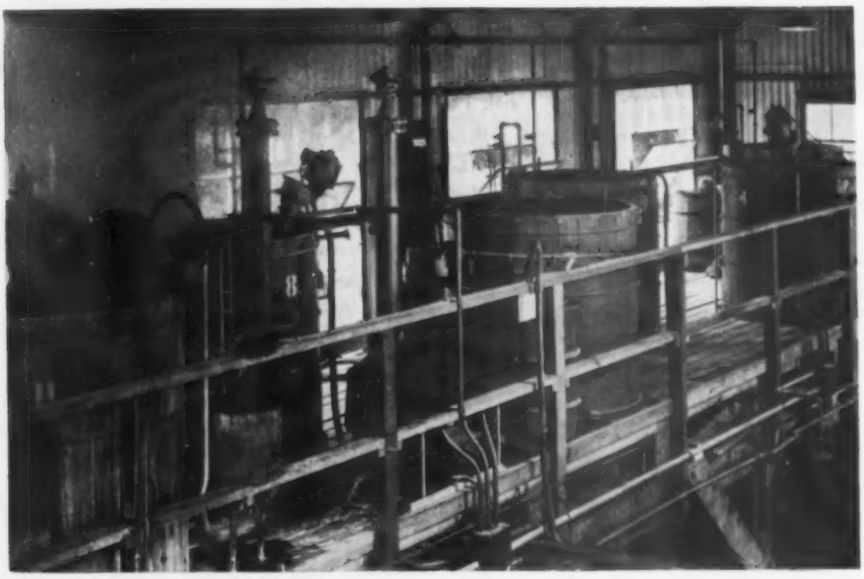

SELECTION OR DEVELOPMENT OF PROCESSES

The recommendations of the CHEMICO engineers in the selection of processes for individual conditions are backed by thirty years of intensive specialization in acid manufacture and recovery.

These CHEMICO specialists are qualified to GO BEYOND THE SELECTION of acid recovery and production processes. On many occasions they have developed NEW processes or modifications of existing processes to meet special requirements; and the sum total of the developments which they have originated have in large measure revolutionized the technique of acid production and recovery.

This phase of CHEMICO service, together with the many other elements that distinguish the work of the CHEMICO organization, explains why plants designed and built by CHEMICO are producing and recovering a far greater quantity of heavy acids than all others combined.

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European Representatives, Cyanamid Products, Ltd., Berkhamsted, Herts, England

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The 6-Point Chemico Service

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2. SELECTION OF PROCESSES
3. Layout and design of plant
4. Erection of plants
5. Training and initial supervision of crew
6. Guarantee of results

CHEMICO CHEMICAL PLANTS ARE PROFITABLE INVESTMENTS

OIL COMPANY EARNINGS

(Continued from page 41)

$2.25; Standard of California $2 against $1.50; Standard of Indiana $1.50 against $1.25; Sun Oil $1.50 against $1; Tide Water Associated 85 cents against 70 cents and Skelly Oil $1.50 against $1.25.

Humble Oil & Refining Co., which split its stock on a two-for-one basis late in 1943, paid out in cash dividends in that year the equal of $2.25 a share of stock prior to the split-up, against $2 in 1942.

Of two companies—Creole Petroleum Corp. and Imperial Oil Ltd., both controlled by Standard Oil Co. (N. J.)—included in the tabulation, and operating abroad, Creole last year increased its authorized capital stock to 27 million shares incident to the acquisition of certain assets of Lago Petroleum Corp., another subsidiary of Standard. In exchange for Lago's assets Creole issued 19,632,254 shares of its capital stock, lifting the latter to 26,696,610 shares outstanding, from 6,974,356 previously.

By reason of the acquisition, Creole's net capital assets advanced to $154.6 million from $75.3 million, and its working capital at the end of 1943 stood at $20.7 million against $4.3 million a year earlier.

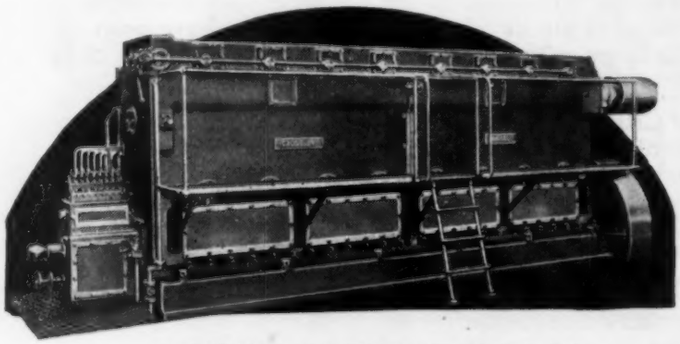
INDUSTRY MUST FACE POST WAR FALL IN DEMAND

(Continued from page 27)

but a prevalent view is that consumption of this product will remain about at its present level.

In this comparison no reference has been made to aviation fuel but it is obvious that the tremendous demand for this specialized product arising from the war will decline to a small fraction of its present proportions with the return of peace. Although a rapid increase in commercial aviation is in prospect the greatest possible growth in this field in the half decade following the war will not occupy more than 20 percent of the capacity now engaged in its production.

It is not necessary to become pessimistic regarding the future of the oil industry because of this prospective falling off in demand. Once the post-war readjustment has been completed it is reasonable to expect that the growth in consumption will be continued at approximately the same rate as in the past. Meanwhile, the members of the oil industry and those in official position who have to do with its operations should give heed to the fact that a problem of readjustment to a temporarily lessened demand does confront the industry for the immediate post war period.



THE 800 b.h.p. 8 cylinder 4 cycle Crossley Diesengine illustrated, is designed for heavy duty, and o. medium weight and speed.

It represents the modern trend in Internal Combustion Engine practice, and is exceptionally accessible, although totally enclosed. Complete exposure of valve gear, etc., is obtained by sliding back the top aluminium covers, and adequate doors give access to crank chamber and cylinders.

Forced lubrication is employed, and starting is by compressed air instantaneously.

75 years experience as pioneers of the industry is a guarantee of efficient and economical operation.

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40-RANGE Universal AVOMETER

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ONE INSTRUMENT measures:—

CURRENT — A.C. 6m/A. to 12 amps. (In 8 ranges): D.C. 6m/A. to 12 amps. (In 8 ranges):

VOLTAGE — A.C. 6 volts to 1,200 volts (In 8 ranges): D.C. 60m/V to 1,200 volts (In 12 ranges):

RESISTANCE — 0 to 1 megohm (In 4 ranges), reading down to 0.1 ohm.

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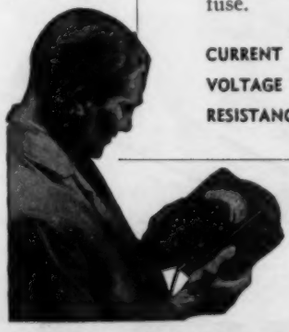

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Originally drilled to 6392 feet, completed and produced 64,000 barrels of oil from this formation during a period of eight years. Salvageable casing was removed to a depth of 5387 feet, the hole was plugged and the Hoover sand zone gun perforated June 10, 1938. The well produced approximately 48,000 barrels during one year from this zone when production dropped to 65 barrels per day. A second gun perforation job increased production to 200 barrels per day.

In the two years following the first gun perforating job the well produced over 100,000 barrels of crude. In 4½ years from the date of the first gun perforating of this Pennsylvania sand, the well had produced 183,000 barrels of oil.

A Record of 11 Years Achievement

TODAY the knowledge of eleven years of constant research and the experience of more than 50,000 successful gun perforating jobs are at the command of American oil producers to help them solve — efficiently, economically and safely—the problems of selective completion, secondary recovery, gas/oil ratio control, water shut off and others.

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HARRY F. ABRAMS

HARRY F. ABRAMS, who occupied a prominent place in the refining industry prior to his retirement in 1939 because of failing health, passed away at his home in Garden City, Long Island, on June 10. His age was 58.

Mr. Abrams entered the employ of Standard Oil Company of New York in 1903 at its Long Island refinery, rising by successive steps through various technical positions. He later transferred to the Vacuum Oil Company becoming manager of its Olean and Rochester plants and serving on the board of directors. When the two companies were consolidated to form the Socony-Vacuum Oil Company, Mr. Abrams was made a member of the manufacturing committee giving special attention to the company's foreign refining operations.

GUY STEVENS

GUY STEVENS, whose acquaintance with oil men extended to every part of the world, passed away on June 11th at the age of 60. At the time of his death he was acting as assistant to the vice president of Gulf Oil Corporation in charge of foreign production with headquarters in New York. Prior to the war he represented Gulf in London and was in charge of the exploratory drilling which the company was conducting in Denmark as general manager of the Danish-American Prospecting Company. He also participated in oil negotiations in the Near and Middle East and was thoroughly familiar with conditions in that part of the world. During the 20's he was manager of the Association of Producers of Petroleum in Mexico. His geniality, tact and broad knowledge of world affairs had won him a host of friends in all ranks of the industry.

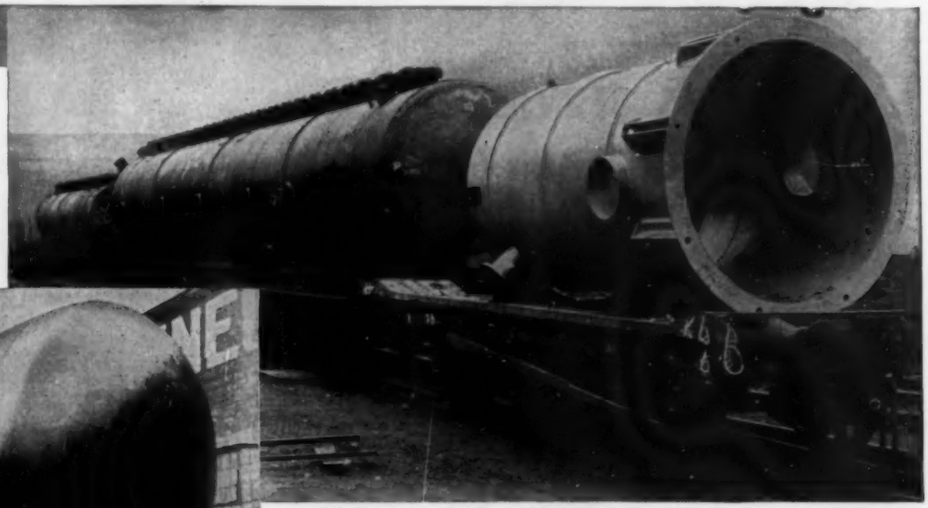
TEIS RESUMES CONSULTING PRACTICE

A petroleum Engineering Consulting office is being opened in Tulsa by Kenneth R. Teis who has announced his resignation as chief engineer of Sunray Oil Company in order to engage in private practice. Teis has had a long association with the petroleum industry, and supervised much of the development in Fitts field, southern Oklahoma.

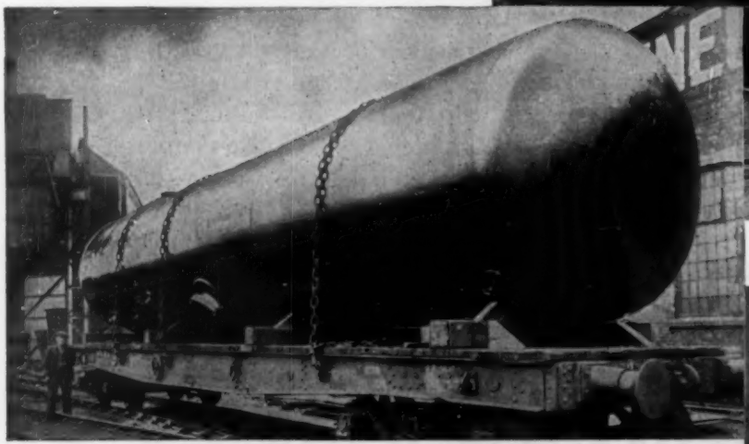
Between 1925 and 1928, Teis held the position of chief engineer of Independent Oil and Gas Company, later acquired by Phillips Petroleum Company. Until the time of this merger, Senator E. H. Moore, of Oklahoma, was president of the company and later, when Senator Moore acquired interests in Fitts field, Teis was retained in an engineering and supervisional capacity. Following the passing of major development at Fitts, he returned to the private practice of consulting engineering and in 1941 joined Sunray Oil Company as chief petroleum engineer.

Kenneth R. Teis

WELDED PRESSURE VESSELS



5' 0" & 6' 6" DIA. × 90' 6" TOTAL HEIGHT. Lloyds Survey & A.S.M.E. Code.



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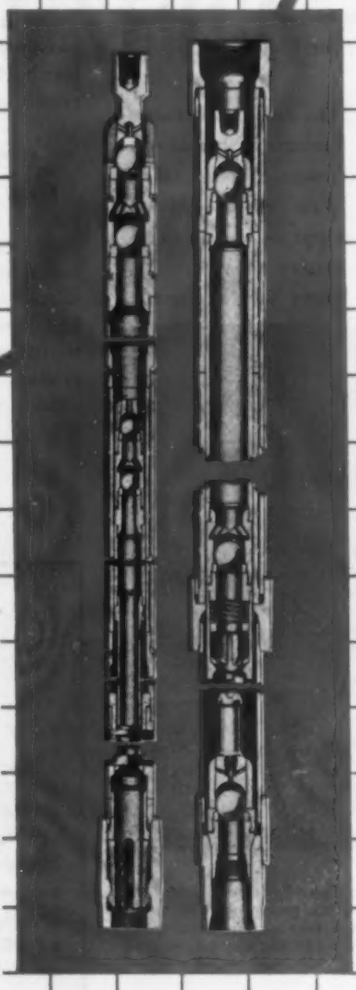
depend on **UNDERGROUND** *equipment*



When underground equipment is faulty or below par in efficiency, the profit line in surface operations drops abruptly. That goes double for deep oil well pumps. Remember, too, there's more than loss of profit involved during these critical days of "keeping 'em flying!"

Every oil producer owes it to himself and the world at large to check his producing equipment and make necessary replacements—or install new modern equipment to speed up the vital flow of oil.

Make it a point to check in on Pacific Engineered Deep Oil Well Pumps. Ask most any of the leading oil producers or field engineers and you'll find that Pacific underground equipment is giving the highest degree of efficiency, endurance and economical operation.

It's good judgment to buy the best—and that's what you get when you buy Pacifics, because Pacific pumps are the *finest* that engineering brains and skilled craftsmenship have been able to put together.

Write for this new Oil Well Pump Catalog containing full information and engineering data on Pacific's complete line of underground pumping equipment—or refer to Pacific's 24-page illustrated section in your 1944 Composite Catalog of Oil Field Equipment.

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PACIFIC *Engineered* PUMPS

CONSULTANTS TO IRAN

UNITED ENGINEERING CORPORATION, S. A. of Caracas, Venezuela, has entered into a consulting contract with the Government of Iran. Herbert Hoover, Jr., president, and Arthur A. Curtice, vice-president of United Engineering left early in June for Teheran. They will advise the Iranian government on questions of petroleum engineering and economic matters related to the petroleum industry in that country.

It will be recalled that Messrs. Hoover and Curtice acted as petroleum consultants last year for the Venezuelan government during the period when major changes in the Venezuelan petroleum law, as well as the renegotiation of concession contracts, were undertaken.

United Engineering Corporation, S. A. is also engaged in petroleum consulting work for several other Latin American governments. While the main office is in Caracas, Venezuela, the company has recently opened an additional office in New York, under the direction of A. H. Chapman.

RESEARCH FOUNDATION

PETROLEUM Industry Research Foundation, Inc., (Pirinc) has been organized for survey, analysis and publication work in the petroleum industry. The new non-profit organization, sponsored by the Empire State Petroleum Association, will be concerned with the collection and presentation of data on all phases of the oil industry, primarily with current and post-war marketing problems.

Pirinc has announced a series of projects in survey and publication. Its first issue, appearing shortly, is a 64-page illustrated booklet entitled "World Oil—Fact and Policy." The work examines the question of an oil shortage and the case for a sound American petroleum policy. It considers the issue of the relationship of government and industry and the proposed trans-Arabian pipeline. Other surveys will follow concerning naval reserves, the cooperative movement in the oil industry, post-war gasoline consumption prospects and petroleum patents.

Pirinc is headed by Harry B. White, executive vice-president; Harry Ozanne, director of research, and a board of directors comprising prominent oil men throughout the country.

OPENS NEW YORK OFFICE

BASIL B. ZAVOICO, formerly petroleum geologist of the Chase National Bank and before that a consulting engineer in Houston, Texas, has opened an office in New York as a consultant in petroleum engineering and geology. Mr. Zavoico, whose experience in the oil industry not only covers the United States but extends to many outside countries, recently resigned his position with the Petroleum Administration for War to resume the practice of his profession.

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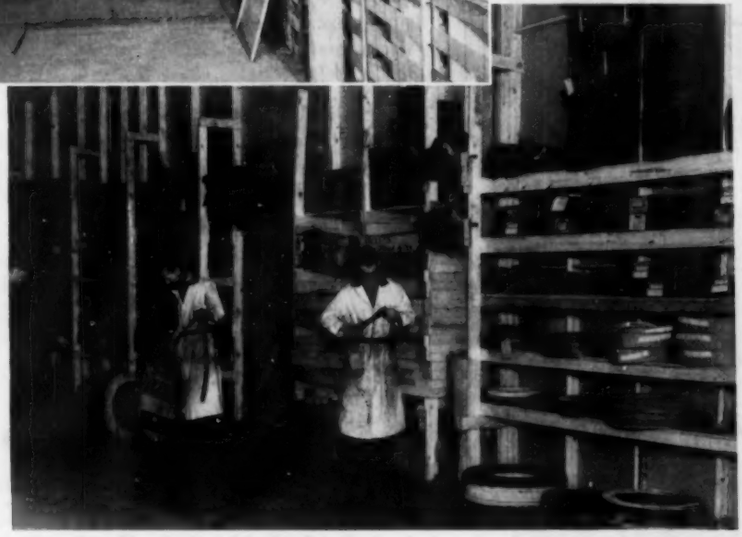

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*Southport Petroleum Co.—on stream January 24, 1944

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Moore offers one competent source of supply and responsibility for the major items of equipment needed to drill and produce oil wells. Here is equipment developed, for and with the petroleum industry, through thirty-five years of engineering and manufacturing experience. It's built for hard work and long life — its use will solve many of your drilling and pumping equipment problems.

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DRESSER CO. CHANGES

H. N. MALLON, president of the Dresser Manufacturing Company, announced election of three vice presidents of the company following a meeting of the board of directors.

J. B. O'Connor has been elected executive vice president. Arthur R. Weis and Lyle C. Harvey have been elected vice presidents.

Mr. O'Connor has been a director of Dresser Manufacturing Company since August 23, 1938. He is also vice president and general sales manager of Clark Brothers; chairman of the board of the Pacific Pump works and president of Bovaird and Seyfang, all subsidiaries of Dresser Manufacturing Company.

Mr. Weiss is president of the Pacific Pump Works of Huntington Park, California, a Dresser subsidiary.

Mr. Harvey is president of the Bryant Heater Company of Cleveland, also a subsidiary.

C. P. Clark of Clark Brothers, who is already a vice president of Dresser Manufacturing Company will continue to serve in that capacity.

John B. O'Connor

NATIONAL ENLARGES CAPACITY

DEVELOPMENTS now in progress at the National Supply Company's Toledo, Ohio, plant will double present capacity for the manufacture of tool joints for the oil industry, and also will provide facilities for production of oil well rotary drilling equipment. Up to this time, National's production of rotary drilling machinery has been confined to the company's Torrance, California, plant.

According to C. R. Barton, vice president in charge of manufacturing, the doubled facilities for tool joints will be ready by October, while full production of drilling machinery should be reached by January.

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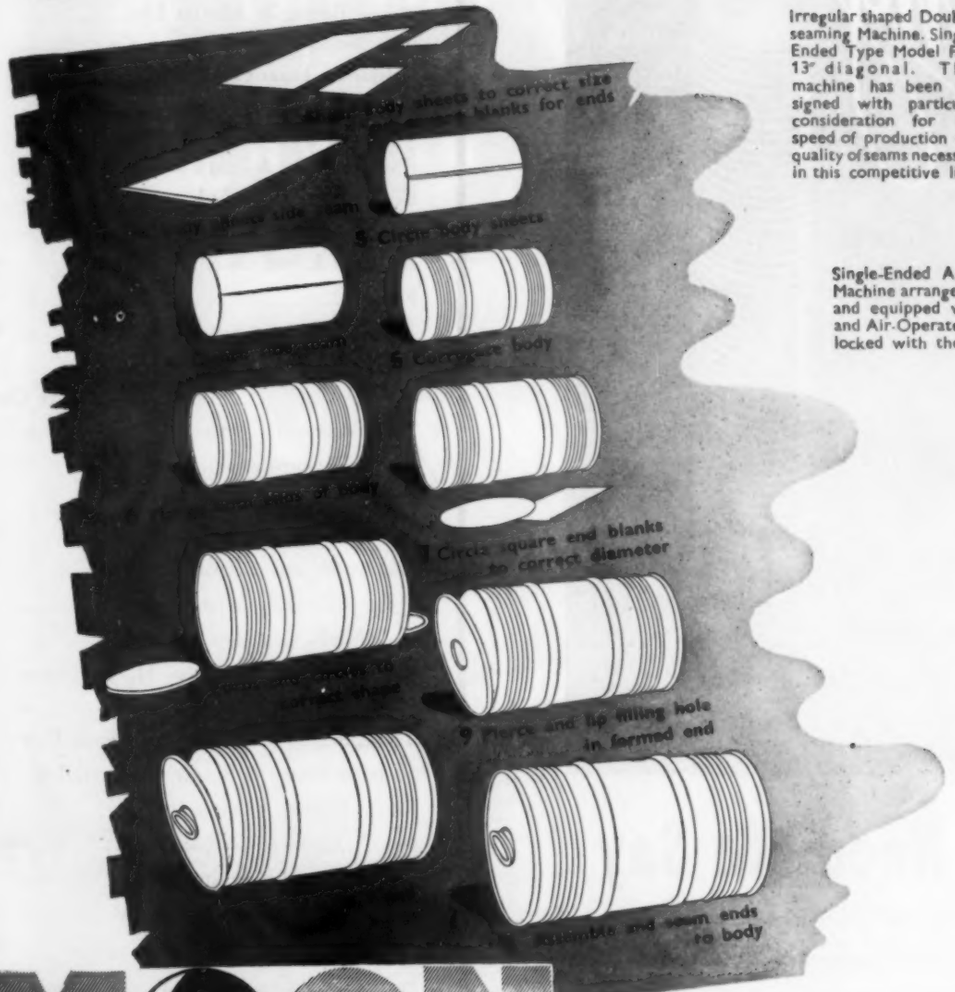
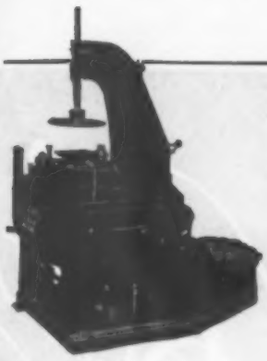
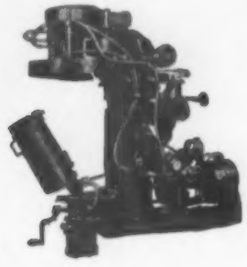

5 Circle body sheets
6 Corrugate body
7 Circle square end blanks to correct diameter
9 Pierce and tip filling hole in formed end

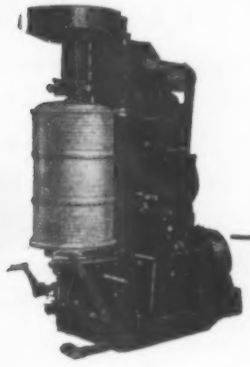


Irregular shaped Double-seaming Machine. Single-Ended Type Model F.Z. 13" diagonal. This machine has been designed with particular consideration for the speed of production and quality of seams necessary in this competitive line.

Single-Ended Automatic Drum Double Seaming Machine arranged for seaming Flush Top Drums, and equipped with Air-Operated Chuck Guard and Air-Operated Clamp; the Clamp being interlocked with the Guard.



Moon Single-Ended Automatic Drum Double Seaming Machine. Seams 14 gauge material. Adjustable pressure cam for various flange widths and flange-truing and lubricating rollers are standard features. This machine can be fitted with automatic guard.



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Drum making machinery by MOON cannot help but produce a "winner." We have had over 30 years' experience in designing drum making plant and we are considered experts at our job. If the time has come for you to produce your own drums, we can advise on and supply the most economical plant. If any phase of your production can be simplified, we can tell you. Our knowledge is yours for the asking. Can we get together?

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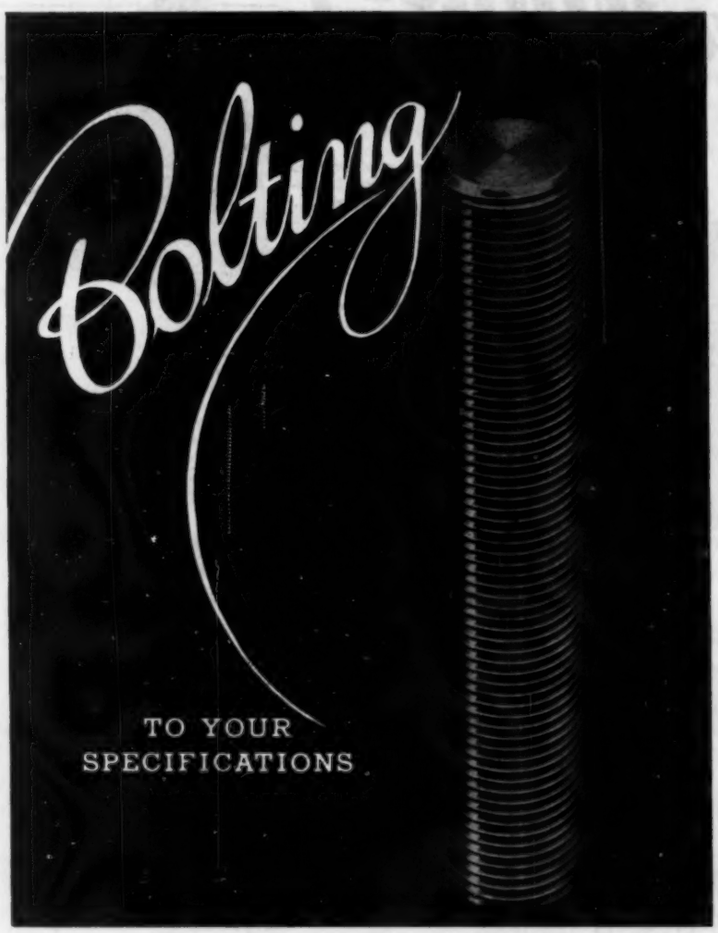

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